WESTERN GAS

···VALVE REPAIRS AT $5.00 PER MONTH ARE *TOO COSTLY!*

change to **EMCO NORDSTROMS** *and* **SAVE** *the difference*

Semi-Steel Valve with gate valve face-to-face dimensions. 150 lbs. working pressure. Sizes 5", 6", 8" and 10".

Cast-Steel Valve with gate valve face-to-face dimensions. Worm gear operated. Sizes 6", 8", 10" and 12".

Semi-Steel Valve with gate valve face-to-face dimensions. 150 lbs. working pressure. Worm gear operated. Size 12" only.

Alert Operators, concerned with the high cost of ordinary valve service, are computing costs of repairs per month.

Several large Companies figure on monthly repair costs at the rate of one dollar per inch per valve. This means $6 per month for a 6" ordinary valve, $12 per month for a 12". One leading Company reports valve repairs at about $5 per month on gasoline distillate manifolds AND since changing to EMCO-NORDSTROM Lubricated Plug Valves has eliminated this exorbitant repair bill—reporting an actual saving of $540 for 12 valves during a nine months' period.

CONCLUSION·· *it's cheaper to install* **EMCO NORDSTROMS**

Now you can replace your present valves with Emco-Nordstroms without altering the pipe dimensions. The same face-to-face dimensions are offered. Simply unbolt the old valve and slip in the Emco-Nordstrom. That's economy of installation, to start with. And the economy continues for years to come. Change to Nordstroms. It costs less. The initial cost is competitive to ordinary valves too, quality and service considered.

Ask for Bulletin V102.

MERCO NORDSTROM VALVE COMPANY *A Subsidiary of* PITTSBURGH EQUITABLE METER CO.
Main Offices: Pittsburgh, Penna. Branch Offices and Warehouses in Principal Cities

HERE'S GREATER DOLLAR VALUE *for* GAS COMPANIES

CHECK THE ADVANTAGES THAT EVENTUALLY MEAN MORE PROFITS!

- √ *Reliability.*
- √ *Great tensile strength.*
- √ *A high degree of ductility.*
- √ *Adaptability for any type of joint.*
- √ *Less interruption to service.*
- √ *Lower laying costs.*
- √ *Longer lengths.*
- √ *Tight joints and less joints per mile.*
- √ *Various coatings available for bad soil conditions.*

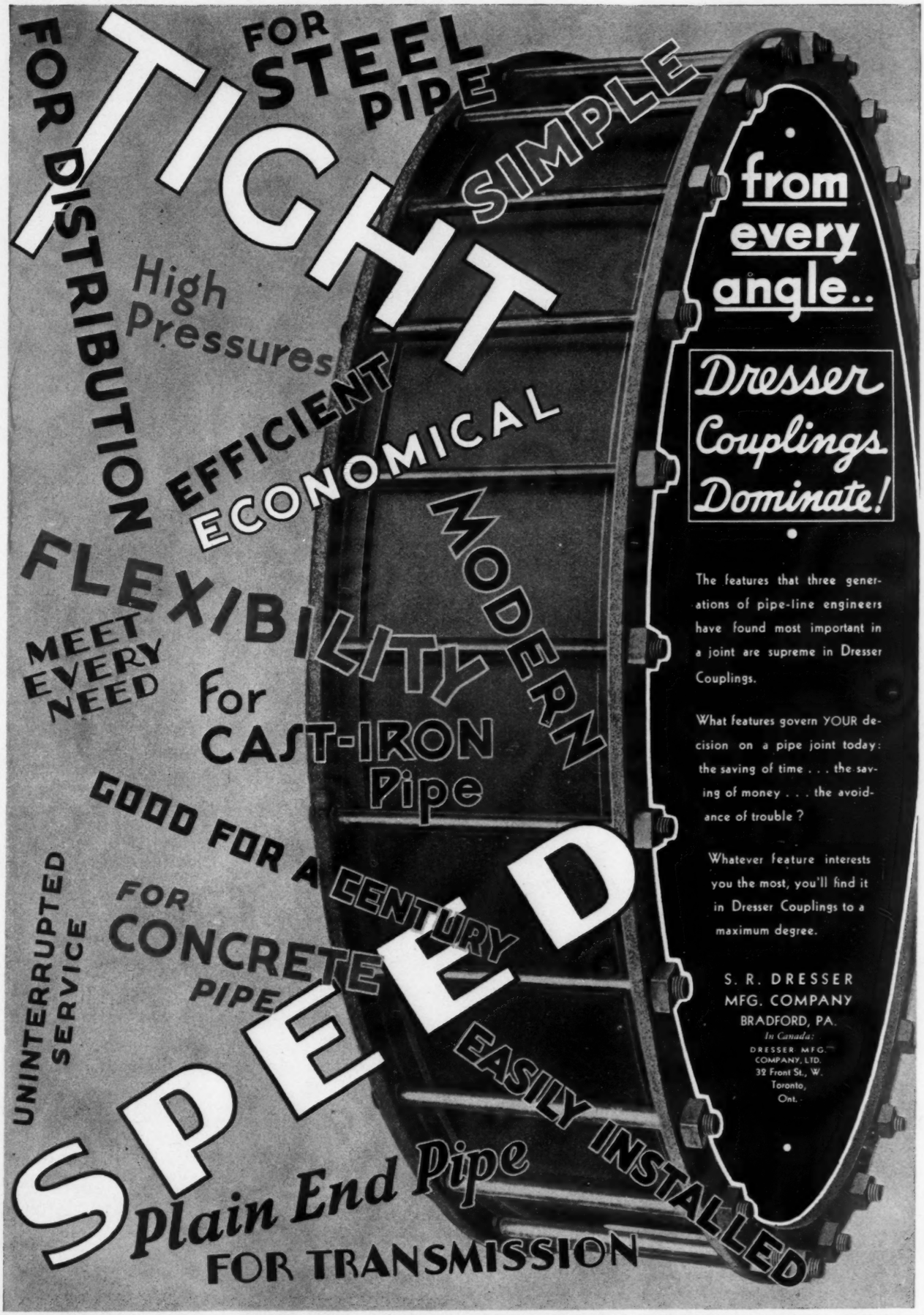
Dollar for dollar—steel mains will yield better profits for Gas Companies. This is being proved over and over every year as steel pipe continually demonstrates its fitness for the necessary requirements of safety, efficiency, and economy.

Users have found that modern steel pipe is capable of withstanding severe external strains as well as those from within. Vibration (heavy street traffic), cave-ins, trench pressures, shocks, wash-outs, settling of filled ground and other external factors that place a heavy burden on underground lines are successfully met by the ductility and high tensile strength of steel pipe.

NATIONAL Steel Pipe for gas mains is made to rigid specifications by the largest manufacturer of steel tubular products in the world. You obtain with it the benefit of proved manufacturing methods and experience in pipe problems. Check its advantages and you find they mean greater dollar value. Specify NATIONAL for superior performance. NATIONAL engineers will gladly cooperate in gas line problems.

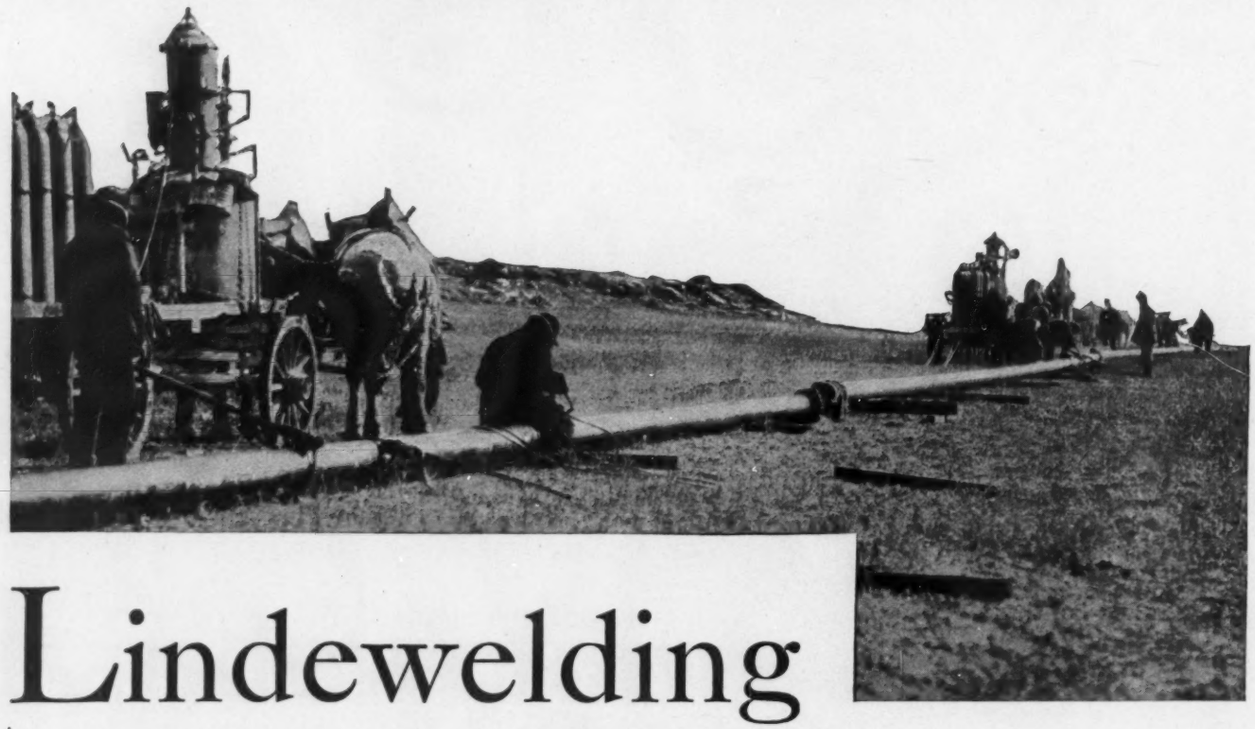
NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL STEEL GAS MAINS


FOR STEEL PIPE
TIGHT
SIMPLE
FOR DISTRIBUTION
High Pressures
EFFICIENT
ECONOMICAL
MODERN
FLEXIBILITY
MEET EVERY NEED
for CAST-IRON Pipe
GOOD FOR A CENTURY
FOR CONCRETE PIPE
UNINTERRUPTED SERVICE
SPEED
EASILY INSTALLED
Plain End Pipe
FOR TRANSMISSION
from every angle..
Dresser Couplings Dominate!
The features that three generations of pipe-line engineers have found most important in a joint are supreme in Dresser Couplings.
What features govern YOUR decision on a pipe joint today: the saving of time . . . the saving of money . . . the avoidance of trouble?
Whatever feature interests you the most, you'll find it in Dresser Couplings to a maximum degree.
S. R. DRESSER MFG. COMPANY
BRADFORD, PA.
In Canada:
DRESSER MFG. COMPANY, LTD.
32 Front St., W.
Toronto, Ont.

June, 1934. Volume X, Number 6. Western Gas is published by Western Business Papers, Inc., at 810 South Spring Street, Los Angeles, California. Subscription price (in advance) 25 cents the copy; $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, under the Act of March 3, 1879.

"WE ORDER EVERYTHING FOR PIPE LINE WELDING FROM LINDE"



Lindewelding *made time* for this Contractor

HE had the signed contract, and had hired the crew. The pipe was strung out. The line had to be finished on time.

This contractor then sought the assistance of the Linde organization in training welders in Lindewelding.

Such aid is a feature of Linde Process Service.

After two days training the whole firing line was Lindewelding. The daily reports tell the story: first day, 93 welds; second day, 193 welds; third day, 210 welds; fourth day, 218 welds; fifth day, 273 welds. And when the Lindewelding got up to full speed, the cost per joint became unbelievably low.

Pipe line contractors all over the country can tell of similar incidents in which Linde Process Service has helped them to organize their welding operations for greater speed, dependability and profit. This is why so many of them buy *everything for pipe line welding from Linde.*

Let the nearest Linde District Office give you the latest data on Lindewelding and show you how Linde can be of assistance to you.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stocks

IN CANADA, DOMINION OXYGEN CO., LTD., TORONTO

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

PRODUCT OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

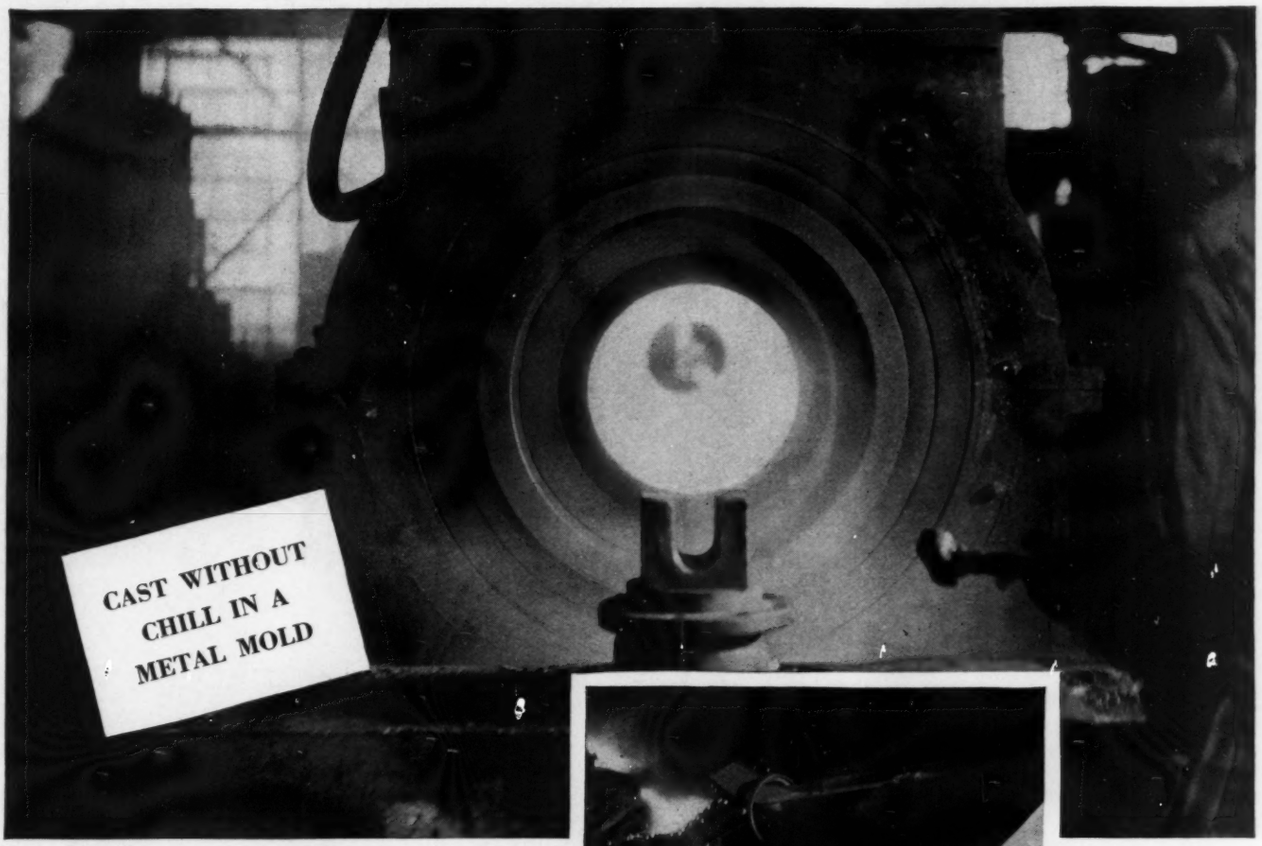
Users of products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. You are cordially invited to visit this summer the numerous exhibits sponsored by the Corporation in both the Basic and Applied Science sections in the Hall of Science at Chicago's 1934 A Century of Progress Exposition.

Sales Offices:

Atlanta	Houston	Portland, Ore.
Baltimore	Indianapolis	St. Louis
Birmingham	Kansas City	Salt Lake City
Boston	Los Angeles	San Francisco
Buffalo	Memphis	Seattle
Butte	Milwaukee	Spokane
Chicago	Minneapolis	Tulsa
Cleveland	New Orleans	
Dallas	New York	
Denver	Philadelphia	
Detroit	Phoenix	
El Paso	Pittsburgh	

NRA WE DO OUR PART

impact strength DOUBLED



A patented improved process of centrifugal casting endows Super-de Lavaud pipe with physical characteristics which make this new pipe radically different from de Lavaud pipe as previously produced. There has been a fundamental metallurgical change in the metal structure. This new pipe is shatter-proofed to the extent that impact-resistance has been increased more than 100 per cent. When tested to destruction by hydrostatic pressure it does not shatter. It is a tougher, more ductile pipe capable of greater deformation without breakage. The factor of protection against handling hazards from plant to underground has been doubled. *Send for descriptive booklet.*

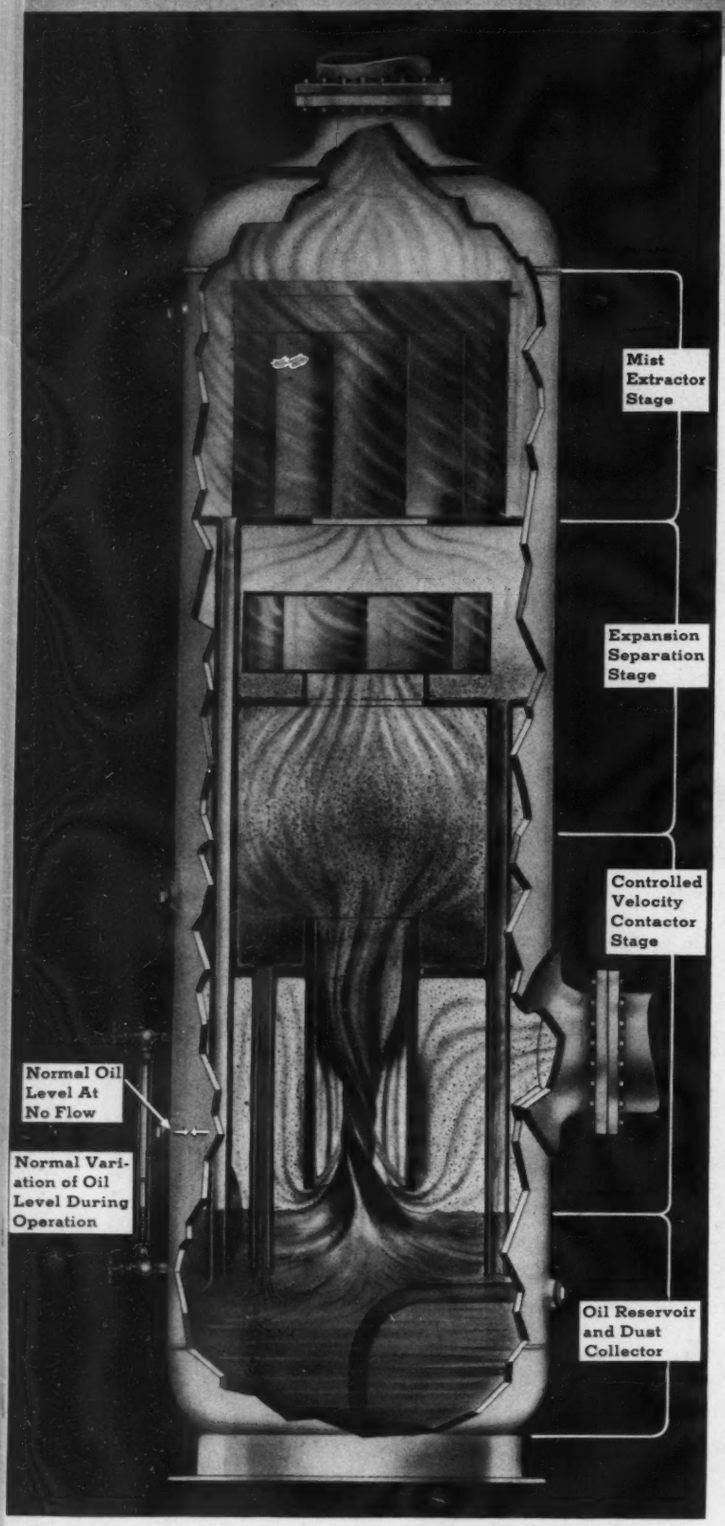
UNITED STATES PIPE AND FOUNDRY CO.
BURLINGTON, N. J.
Foundries and Sales Offices throughout the United States

Two years ago our research and technical staffs found a way to accomplish the "impossible." Super-de Lavaud Pipe is cast without chill in a metal mold. The product of this revolutionary process is an unchilled gray iron casting with extraordinary impact-resistance. The resultant metal structure fractures *non-directionally* counteracting fragmentation and permits a new annealing technique still further increasing impact-resistance.

NRA

U.S. SUPER-DE LAVAUD PIPE

BLAW-KNOX GAS CLEANERS


Mist Extractor Stage
Expansion Separation Stage
Controlled Velocity Contactor Stage
Normal Oil Level At No Flow
Normal Variation of Oil Level During Operation
Oil Reservoir and Dust Collector

Cut away drawing showing operation of Blaw-Knox Gas Cleaner.

Deliver clean gas.

Remove all dust and liquid entrainment.

Operate without attention or shutdowns over long periods. Are capable of continuous operation.

Offer negligible resistance to gas flow.

Collected material is taken from path of gas flow and is quickly removable without shutting off gas flow.

Liquid contactor type.

Clean gas reduces maintenance costs, service calls and insures better public relations. Let us tell you about the experience of others using Blaw-Knox Gas Cleaners. We will be glad to demonstrate how this equipment can be adapted to the working conditions of any company.

BLAW-KNOX COMPANY
2033 Farmers Bank Building
Pittsburgh, Pa.

BLAW-KNOX GAS CLEANERS

CAST IRON PIPE
with gas-tight mechanical joints

Cast iron pipe with gas-tight mechanical joints meets reemployment conditions perfectly, requiring no skilled labor and no tool except a ratchet wrench.

Several mechanical joints are made by C.I.P.R.A. members. They differ in design but derive from the same basic principle. All are gas-tight in service.

The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 309 Peoples Gas Building, Chicago, Ill.

Reproduction of the micrograph above shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent they give Barrett Pipe Enamels unusual toughness and resistance to soil stresses.

For pipe of large diameter, The Barrett Company will furnish equipment required to revolve pipe and spread Enamel.

Chemically Inert—Mechanically Tough

Defying Climate, Earth Acids and Electrolysis

Corrosion and electrolysis quickly age and destroy an unprotected pipe line. Barrett Specification Pipe Line Enamels provide a lasting film of protection which is a non-conductor of electricity . . . a tough, strong coating immune to moisture and earth acids. They are the result of eighty years of experience in waterproofing and the development and application of coal-tar protective coatings. The Barrett Technical Staff and Barrett Field Engineers will gladly cooperate with you on any pipe-line protection problem. 'Phone, wire or write.

Barrett Specification

PIPE LINE ENAMELS

THE BARRETT COMPANY, 40 Rector Street, New York, N. Y.

ADVERTISERS' INDEX

American Gas Products Corporation 37
American Meter Company 8
American Stove Company 3rd Cover
Automatic Products Co. —

Barber Gas Burner Co. —
The Barrett Company 6
H. R. Basford Company 36
Blaw-Knox Company 4
Butane Sales Co. 28

The Cast Iron Pipe Research Assn. 5
The Chaplin-Fulton Mfg. Co. 50

Dearborn Chemical Company 48
The Denver Fire Clay Co. —
S. R. Dresser Mfg. Company 1

Electrogas Furnace & Mfg. Co. 38
Electrolux Refrigerator Sales, Inc. 39
The Estate Stove Company —

Fluor Corporation, Ltd. 31
Fraser Furnace Company 36

General Ceramics Company 42
James Graham Manufacturing Co. 49

Harry F. Haldeman, Inc. 44

Johnson Gas Appliance Co. 44
Jones & Laughlin Steel Corp. —

Kerotest Mfg. Co. 28

The Linde Air Products Company 2

Merco Nordstrom Valve Co. Front Cover
Minneapolis-Honeywell Regulator Co. 43

The National-Superior Co. 47
National Tube Company 2nd Cover
Natural Gas Equipment Inc. 30

Oxweld Acetylene Co. 2

Pacific Coast Gas Association 23
Pacific Gas and Electric Company 41
Pacific Gas Radiator Co. 48
Payne Furnace & Supply Company 45
Pittsburgh Equitable Meter Co. Front Cover
Pressed Steel Tank Company 27
The Prest-O-Lite Co., Inc. 2

Reliance Regulator Corporation 29
Republic Steel Corp. Back Cover
Reynolds Gas Regulator Company 47
Robertshaw Thermostat Co. —
Ruud Manufacturing Co. —

Safety Gas Main Stopper Company 36
Wm. B. Scaife & Sons Co. 28
The Sprague Meter Co. 40
Surface Combustion Co. 33-34

Union Carbide & Carbon Corp. 2
Union Carbide Sales Co. 2
United States Pipe and Foundry Co. 3

Ward Heater Company 42

WESTERN GAS

"Reg. U. S. Pat. Off."

Publication Office: 810 South Spring Street, Los Angeles, Calif.
District Offices: 110 East 42nd Street, New York; 447 Sutter Street, San Francisco

MEMBER PERIODICAL PUBLISHERS INSTITUTE — MEMBER AUDIT BUREAU OF CIRCULATIONS

Contents for June, 1934

Editorial 9

Remodeling Memphis Plant for Standby Service 10
By W. A. Dunkley

Mobile Displays on the Lone Star System 12

Better Water Heating Service for the Apartment House 13
By L. O. Howell

House Heating in Tucson 14
By B. L. Sweet

ABSTRACTS 15
Transmission 15
Plant Practice 16
Distribution 18
New Business 19

PACIFIC COAST GAS ASSOCIATION 21

MEASUREMENT AND CONTROL 24

A Standard Gas Sample For Checking Gravity Instruments . . 24
By Guy Corfield

BUTANE-PROPANE NEWS 26

California Safety Orders Reviewed 26
By F. A. Page

WESTERN GAS is published by Western Business Papers, Inc., 810 South Spring Street, Los Angeles, Calif.

Copyright, 1934, by Western Business Papers, Inc.

JAY JENKINS, Publisher, GEORGE H. FINLEY, Editor, CRAIG ESPY, Eastern Manager
OFFICIAL PUBLICATION, Pacific Coast Gas Association; Southern California Meter Association.

● Modern meters on your lines tell their own story. They sell gas as the modern fuel it is, and they sell your service as the progressive, efficient SERVICE it is . . . both of which are vital to the building of residence heating and other attractive loads. ● Besides the ECONOMIC advantage . . . lower cost per meter year . . . today's American meters give you greater capacity ranges providing for load building. ● American Meter Company Tinned Steelcase and Ironcase meters give you in one line a complete range of capacities and sizes. Catalogs and any data you may request will be mailed promptly.

. . . also RELIANCE REGULATORS for close pressure control and positive lock-up.

AMERICAN METER COMPANY
INCORPORATED
Measurement and control of Gas, Oil, Steam, Air and Liquids
ESTABLISHED 1836

Meter Trade Names:
AMERICAN—D. McDONALD—METRIC—MARYLAND—PACIFIC—TUFTS
Albany Baltimore Birmingham Boston Chicago Dallas Denver Erie Kansas City
Los Angeles Philadelphia Pittsburgh New York San Francisco Tulsa

229

June, 1934

WESTERN GAS

"Reg. U. S. Pat. Off."

Vol. X, No. 6

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

About Umbrellas

DID you see the illustrated editorial on the front cover of May *Electric Light and Power?* The picture shows a man holding an umbrella over a gas holder with one hand while he props up an electric transmission tower with the other. Perhaps he is not propping it up—he may be holding it back so it will not step on and demolish the gas holder.

The text reads in part:

"Why the umbrella? Gas has done just about as well in cities where it has had active competition as where it has been coddled.

"Electric utilities can win their battles but not with their good right arms occupied in holding the umbrella over the gas business. . . .

"The public is being primed to demand all-electric homes. New and important agent in the cultivation of this demand is the United States government, just now the world's most potent molder of public opinion. Millions accept the federal government's endorsement as gospel. And the United States government is definitely backing electricity. . . .

"Uncle Sam's new nephews, TVA and EHFA, are actually promoting domestic electrification with all methods successfully employed by privately owned electric utilities. And this effort is deliberately planned to influence the entire nation. The fairness and wisdom of this governmental activity are open to question, but that is beside the point. The trend is electric, the politics is electric, and the future belongs to electricity. . . ."

Gas men will agree with this electrical brother in the premise. The slick fingers of the New Dealers are dealing the cards off the bottom of a stacked deck. What the unthinking millions hail as a new deal is a dirty deal for the gas man, the coal man, and the oil man. There can be no argument about that. There might be an argument over the proposition that it is also a dirty deal for the unthinking millions who will have to pay for it, but that again is beside the point—we are interested in that umbrella.

As much as we may agree with portions of the editorial quoted above, we cannot swallow that umbrella. The electric industry was built with the credit and money of the gas industry and grew up in the shade of the gas umbrella. During the late depression (we hope we are right in calling it late) there were instances in which the gas department of dual companies kept the wolf from the stockholders' door by more than making up for electric department deficits.

As an Irishman might say, the umbrella was on the other foot. Gas may be coddled in some localities—we do not know every local situation. More often, however, it has to fight with muffles on its fists. The gas company which is free from electric domination and can fight with bare knuckles can always do better. Probably the truth of the matter is that in every dual company there is an umbrella held impartially, now over the gas department and now over the electric department, as the appearance of the consolidated balance sheet may dictate. The development of the gas department suffers in consequence because the higher fixed charges and poorer load factor of the electrical industry make more and more new business essential to it and it is steadily encroaching in fields which gas can serve better and cheaper.

There is another viewpoint which our electric friend has not mentioned. Granting for the moment that the future does belong to electricity, what does the future hold for private initiative in the electric industry? TVA, EHFA, Boulder Dam, Bonneville, Grand Coulee, the Central Valley Project, the proposed St. Lawrence development, Hetch Hetchy, and many others hold forth no reason for rejoicing on the part of the electric industry. Truly the political trend is electric, but Santa Claus seems to have forgotten the electric shareholder. He is nothing but a tax payer to the New Deal. History is replete with instances in which the unthinking millions have done plenty of damage at the ballot box when sufficiently misled, and the cry to soak the electric utility is now issuing from the mouth of every candidate.

While it is admittedly tough to be obliged to compete against the government one pays to maintain, gas is doing it quite successfully in several places. Those electric utilities which have a nice gas holder handy might do well to hold the umbrella over it a while longer. They might even take its muffles off and let it strike a blow or two.

—*Clifford Johnstone.*

Remodeling the Memphis for Standby

By W. A. DUNKLEY

THE past 10 years have witnessed an unprecedented extension of natural gas pipe lines to cities and towns previously served with manufactured gas. In some cities natural gas is mixed with water gas or coke oven gas before distribution, but in a majority of cases straight natural gas is distributed to the customers.

The change from relatively low B.t.u. manufactured gas to high B.t.u. natural gas has necessitated a radical change in the adjustment of customers' appliances, because of the change in specific gravity, burning characteristics, or both, accompanying the change in heating value. Gas men in most cases have realized that in making these changes they were in effect burning their bridges behind them, knowing that it would be practically impossible to go back to low B.t.u. manufactured gas even for short periods of time and render satisfactory service to customers.

Most gas companies which have gone to natural gas distribution recently have retained their manufacturing plants as standbys. This has been done with the hope that some kind of service, however unsatisfactory, could be rendered by these plants during a natural gas interruption of short duration. Some few companies may have cherished the hope, if not the expectation, that such an emergency would never occur—at least in their cases.

Meanwhile gas engineers and operators have been seeking a means whereby their standby plants, with more or less radical remodeling, could be fitted to produce a high B.t.u. gas that would be a satisfactory substitute for natural gas. A number of processes have been worked out. All of these that have come to the attention of the writer are modifications of the standard carburetted water gas process or involve the conversion of water gas sets to oil gas generators.

Qualifications of a Standby Gas Plant

It is not the purpose of this article to discuss the relative merits, either practical or theoretical, of these various processes. The selection of process in any case must depend upon conditions existing in the plant to be converted. In the plant operated by the writer it was deemed necessary that the process adopted have in a high degree, the following qualifications:

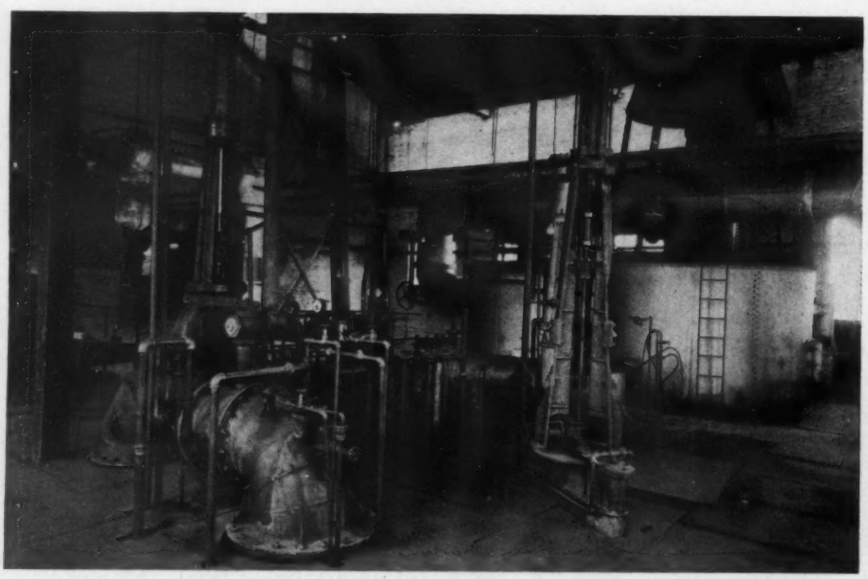
1. Capable of being brought to operation from cold condition rapidly.
2. Give a maximum production of high B.t.u. gas per hour.
3. Require a minimum force of trained operators.
4. Produce a gas that would be satisfactorily interchangeable with natural gas in the majority of customer appliances.

In selecting a process it was realized from the start that it would be utterly impossible to produce sufficient gas with the existing equipment, even after remodeling, to serve all classes of customers during the heavy load season. Calculations were based, therefore, upon giving emergency service only to domestic, small commercial and selected institutional customers (such as hospitals). It was assumed that all other classes of customers would be shut off as soon as possible in case of a serious pipe line interruption.

Remodeling Water Gas Sets

After studying the requirements of our customers, it was decided that the Refractory Screen Oil Gas Process developed by the Combustion Utilities Corp. met our standby plant requirements, at least as well as any other process. It was decided to apply this process to our two largest water gas units. These units are 11-ft.-0-in. water gas sets, one a Steere back-run set about seven years old, the other a Gas Machinery hot valve set about 15 years old.

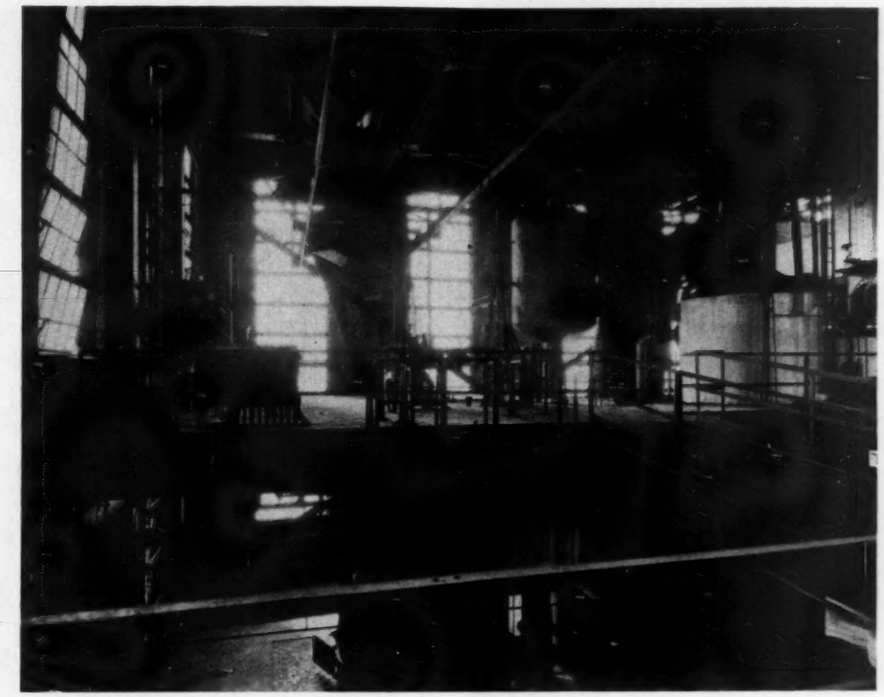
In remodeling the Steere set the following important changes were made:



Operating floor and controls of Gas Machinery Co. 11-ft.-0-in. water gas set converted to oil gas generator.

Plant Service

Superintendent Gas Department
Memphis Power & Light Company
Memphis, Tennessee



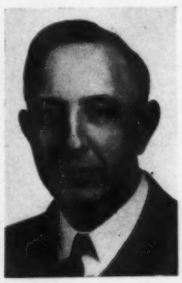
General view of Steere 11-ft.-0-in. water gas set, converted to Refractory Screen Oil Gas Generator.

1. Grates were removed and Refractory Screen (artificial fuel bed) supported by arches was substituted.

2. A 42-inch upper hot valve was installed.

3. A 22-inch down blast connection with hydraulic gate valve and butterfly valve was installed, connecting blast main to charging branch of generator.

4. A 24-inch connection with expansion fitting was installed between bottom of generator and waste heat boiler stack. Waste heat boiler stack valve was utilized but boiler itself was blanked off from both the gas set and boiler stack. Water spray for cooling down-blast offtake was installed.



W. A. Dunkley

5. Wash box seal was deepened from approximately 48 inches to 66 inches.

6. Back-run steam connection was removed from superheater and steam connections were made, one on either side of upper hot valve.

7. Four-way valve in back-run was blocked so that it would close against back-run line only.

8. Oil spray was installed in top of generator and oil burners were installed in top of generator, bottom of generator, and top of carburettor.

9. Control valves on oil lines were connected to be operated by hydraulic cylinders.

10. In addition to existing oil meter on carburettor oil line, meters were installed on oil line to top of generator and to generator and carburettor heating-up burners.

11. Three Pyrometer fire-ends were installed in generator—one about 1 foot above arch, the second 2½ feet above arch and the third 4 feet above arch. In addition existing Pyrometer fire-ends, one about 6 feet above bottom of carburettor and the other half-way up superheater shell, were used.

12. All control valves were reconnected for proper sequence to UGI automatic control.

13. Three tiers of checker bricks were removed from carburettor to give proper distribution of oil.

Conversion of Gas Machinery Set

The conversion of the Gas Machinery set was similar in many ways to the conversion of the Steere set except that it already had upper and lower hot valves which were left in place. The back-run connection was disconnected and no auxiliary stack connection was installed in this case. The set was arranged to be operated very much the same as a regular hot valve water gas set, the generator gases, during all parts of the cycle, passing on through the carburettor and superheater. This set, being connected for manual operation through a hydraulic valve nest with an insufficient number of valves for the new process, required auxiliary three-way Nordstrom valve controls for handling steam and oil. It was found necessary to install an expansion fitting in the down-run gas connection. A Venturi tube was installed in blast connection to measure the down blast.

The different arrangement of the two sets necessitated different operating conditions and methods. In the Steere set the generator make-gas bypasses the carburettor and superheater through the back-run connection, mixing with the carburettor oil gas in the wash box. The down-blast gas does not pass through the carburettor and superheater but passes out via the auxiliary stack.

With an 11-ft.-0-inch set the starting up procedure is as follows:

Set is started with stack valve and upper hot valve open; oil, steam, blast and hydraulic systems up to working pressures. Oil burner in bottom of generator is lighted with an acetylene ignition torch, generator blast being adjusted to give about 1500 cubic feet of air per gallon of oil burned. Oil is first burned at rate of about 2 to 2½ gallons per minute, being increased to 3½ or 4 gallons near the end of the first hour. At the end of two hours, carburettor burner is lighted, burning oil at about same rate as when starting generator burner. Carburettor oil is increased to about 3½ to 4 gallons per minute after 45 minutes. Correct carburettor blast pressure is indicated by a red cone, about a foot high in combustion products, at stack. The heating up process from cold requires about four hours and is continued until thermo-couples in bottom of generator shows 1800° F. and carburettor and superheater show 1600° F. and 1300° F. respectively. Oil burner in bottom of generator is then removed and inserted in top of generator.

Gas-Making Procedure

During the first five cycles about 30 gallons of oil per minute in generator

(Continued on Page 35)

Mobile Displays *on the* Lone Star Gas System

FOR several years mobile displays have been used successfully by the Lone Star Gas System, which operates 4,000 miles of integrated pipe lines over an area several times larger than the state of Illinois and serves more than 300 Texas and Oklahoma communities and cities. Two mobile units have proven valuable in advertising and selling the economy and convenience of natural gas equipment to city dwellers as well as rural.

Newest of these is an Electrolux auto trailer. A model ED-60 Electrolux with special glass door is anchored to the floor of a specially constructed flat-bed trailer on air-wheel tires. Two 12-inch test drums of Stargas (liquefied petroleum gas product made at Lone Star natural gasoline plants) furnish the fuel for the "tiny flame."

The simplicity of the arrangement bares the box to all eyes and enhances the mystery of refrigeration by heat, attracting crowds wherever the trailer stops. A system-wide Electrolux campaign which began March 15 will be augmented by this trailer which went into actual service last fall during the Texas State Fair.

It can be attached to any car and the running gear is constructed to stand ordinary road travel, making the trailer available to sales representatives over the entire system at a minimum transportation cost.

Last fall during an Electrolux campaign in a small city, a sales representative drove the trailer into driveways and invited prospective buyers out to see a gas refrigerator in operation right in their front yards. The unit reaches maximum efficiency as an advertising display in public gatherings, fairs, on downtown streets where it attracts wide attention and elicits questions from spectators. A large percentage of the questioners are developed into good prospects.

ILLUSTRATIONS

Above: Stargas display truck, equipped with Electrolux, range and water heater, all operated from Stargas drums.

At Left: Specially designed auto trailers for demonstrating Electrolux. Two 12-inch drums of Stargas furnish the fuel.

Another mobile display, a truck completely equipped as an all-gas kitchen, has been operated four years by the Stargas department of the Lone Star Gas Co. J. W. Martin, Stargas sales manager, and originator, says it has proven the most effective and practical method of showing that city cenvenience of natural gas service is available to rural or isolated homes. It has also proven efficacious in demonstrating modern appliances to city prospects as well.

The truck is equipped with automatic range with oven heat control, gas lights, 3-foot Electrolux, and 20-gallon storage type water heater. The body is mounted on a 2-ton truck. Two drums of Stargas, 96 pounds capacity each, enclosed on the rear in an upright position supply the fuel for the appliances. A water tank with 50-gallon capacity under 40 pounds pressure actuates the automatic water heater. Water and air can be taken at any filling station.

Every community on the Lone Star System has been visited by this truck, which has traveled 17,000 miles. On an initial and purely demonstrative trip, two men are assigned to the truck. One demonstrates the appliances inside; the other remains outside to explain advantages of the Stargas installation.

In addition to routine trips, the truck is available to local offices for demonstrations of appliances to city consumers as well as prospective Stargas buyers. The first two years it was made available to 40 county demonstration agents who used it in demonstrations to groups of housewives, rural and small town. Its popularity lies in the fact that hot weather demonstrations may be con-

(Continued on Page 35)

Better Water Heating Service *for the* Apartment House

By L. O. HOWELL
*Los Angeles Gas and Electric Corporation**

DURING the last year the water heating systems of 13 apartment houses have been investigated by the gas distribution department of the Los Angeles Gas and Electric Corp. These investigations have been made with the object of improving hot water service and reducing its cost. The quality of service is usually determined by the adequacy of equipment and the manner in which it is installed. Costs are influenced by a great number of correlated factors.

Each installation consists, in general, of one or more water heaters, a storage tank, connecting piping, and supply piping.

The heaters investigated included copper coil heaters, storage heaters of various types, small water tube type heaters, cast iron steam boilers, for indirect heating; and a self-contained storage type indirect heater. No attempt was made to determine which type of heater was most efficient or best adapted to any particular service, because there were not enough investigations to establish averages for comparison of the different types of heaters encountered. Individual comparisons would be complicated by too many variables; such as, variations in draft, piping, load characteristics, and water hardness. However, some information which applies to all heaters or to a great many heaters, was obtained.

Heaters were frequently found operating at gas input rates which differ materially from the name-plate or catalogue requirements. Inputs were decreased in the belief that the gas bill would be lowered in proportion to the amount the input to the heater was reduced. They were increased to increase the capacity of inadequate equipment, or to recover capacity lost through fouling of heating surfaces by dirt and scale.

Few heaters can be set exactly at some predetermined rate of flow, because of minor variations in service pressure, size of orifices, etc. These variations are relatively small, and are normally provided for in the design of the heater. However, there are limits to the changes that can be made without affecting the safety or economy of operation.

A reduction of input was found to lower the efficiency of the heating system in several instances; as much as 11 per cent in one case, where the input was materially reduced. The most serious result of reducing input occurs when the heater is unable to maintain water temperatures during peak periods. This causes complaints from the tenants, and a noticeable increase in the consumption of hot water.

An increase in input does not seem to affect the efficiency quite so rapidly. One exceptional case was found where the input had been increased to the point where the flue gases were combustible. The ordinary limit to increased input is set by safety considerations. Flame impingement, smothering, and insufficient air for combustion limit the maximum capacity in a manner depending on the design of the appliance, available draft, etc.

*Presented before the Pacific Coast Gas Association's joint conference of Commercial and Advertising Sections, March 29-30, 1934.

The satisfactory operation of thermostatic controls was found to depend on their location in the heating system, and the extent of their control over the fuel input.

A thermostat located too near the heating surfaces is likely to become coated with scale and lose some of its sensitivity. At a location near the lowest level of the heating system, the thermostat may be frequently actuated as cold water is introduced into the system from the supply or return lines. This causes frequent operation of the thermostat, which may wear the valves and lead to leakage. It also maintains the entire volume of water at, or above, the control temperature. The temperature at the hot water outlet, then, depends on its height above the thermostat, and the temperature gradient. Since this temperature gradient may vary from time to time, there is little effective control over maximum water temperatures.

If the thermostat is located near the top of the storage tank, the stored water below is at the control temperature, or lower. This limits the maximum water temperature but reduces the amount of water stored at the control temperature.

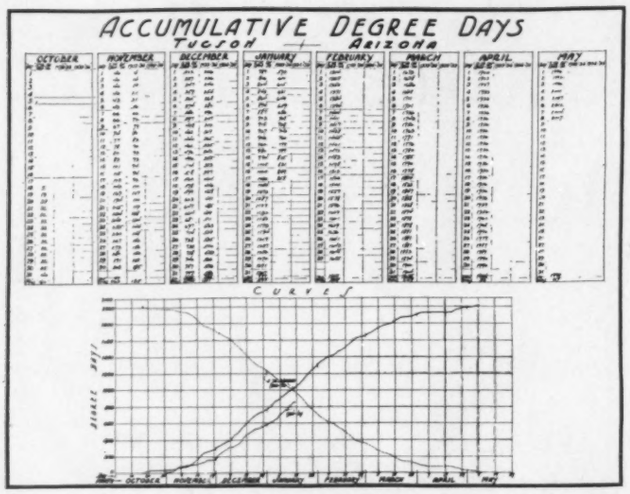
An accepted compromise between these two locations is to put the thermostat at the center of the storage tank. This usually provides an adequate volume of hot water to meet peak conditions, and eliminates the undesirable characteristics of a location low in the system.

Serious thermostat trouble may arise when a thermostat does not have full control over the fuel heating the water adjacent to it. This condition occurs

(Continued on Page 32)

TABLE NO. 1. APARTMENT HOUSE DAILY HOT WATER CONSUMPTION
(One Week or More Averages)

	Gallons												Ave.
Per Apartment	34.4	36.0	35.5	40.0	37.2	61.0	52.3	22.2	60.0	48.9	40.5	70.0	44.8
Per Fixture	——	——	9.2	7.4	8.5	15.3	——	——	18.2	11.2	——	13.2	11.9
Per Person	17.9	21.0	18.6	24.5	——	——	33.1	13.2	30.0	21.1	20.2	23.4	22.2



MONTHLY FUEL DEMAND PERCENTAGES

Tucson — Arizona

Meter Reading Heating Date Monthly	6	11	16	21	26	31 (Last of Calendar Month)
OCT.				1.60	1.60	2.00
NOV.	2.14	3.82	5.70	9.07	11.65	13.04 (30)
DEC.	16.66	18.00	20.97	21.41	22.85	23.50
JAN.	24.80	25.08	23.90	22.90	24.35	26.30
FEB.	25.77	24.74	24.44	24.14	20.92	17.26 (25.12)
MAR.	16.21	16.16	14.13	13.50	11.90	12.35
APR.	10.66	8.18	6.84	3.52	4.85	4.25 (30)
MAY	3.76	4.02	4.02	3.86	1.88	1.30

Two forms illustrating special use of degree day data in Tucson

House Heating *in* Tucson

By B. L. SWEET

The Tucson Gas, Electric Light & Power Co.
Tucson, Arizona

SPECIAL conditions affecting sale of natural gas for house heating in Tucson, Arizona have been under observation since last December, a short time before introduction of natural gas service. Gas consumption was estimated by degree days, and the proper sizing of heating plants was arrived at by the B.t.u. per hour house loss method.

It has been commonly accepted that when the degree days fall below 1800 per season, accuracy of estimates cannot be expected. While we have not had observations under a 100-degree day month to date, we believe due to the high room temperatures of 75 and 80 degrees which have to be maintained in Tucson for comfort, that gas consumption will follow closely in proportion to the degree days below 100, as it does in the colder months.

The past five seasons in Tucson show a wide variation in degree day totals—with a low of 1742 and high of 2198. The five seasons are:

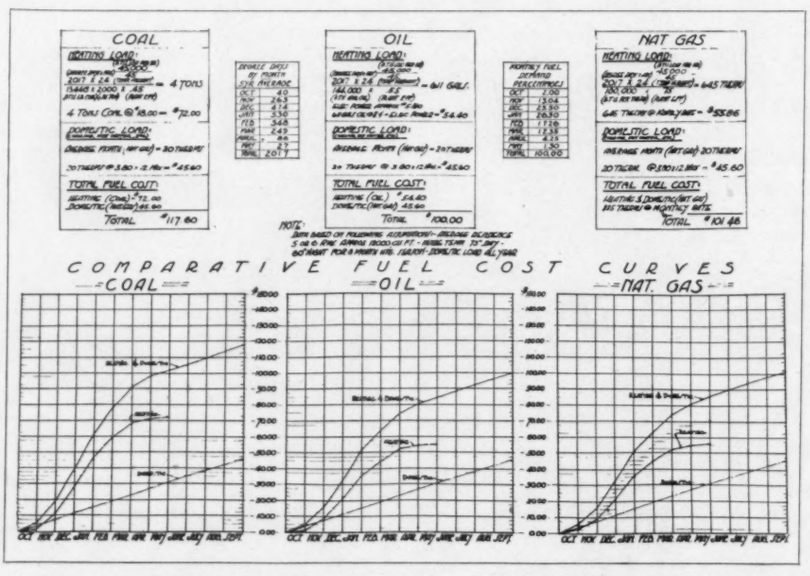
1928-1929—2115 Degree days.
1929-1930—1865 Degree days.
1930-1931—1742 Degree days.
1931-1932—2161 Degree days.
1932-1933—2198 Degree days.
1933-1934—1500 Estimated.

For estimating purposes our average for five seasons is 2017 degree days. A low degree day year such as in 1930-1931 would be 13 per cent less therms used than estimated. For a high degree day year such as 1932-1933, 9 per cent more therms would be used than estimated. These percentages apply only to observed temperatures and will be increased or lessened by the accuracy in measurement and application of heat loss coefficients to give a final percentage of error in the season's estimate.

From a comparison of therms used against actual degree days during December, January and February, 1933 1934, on several homes using central heating plants controlled by room thermostats, it was found that the percentage of error was near to accuracy, the greatest error being 5 per cent; when rechecked this was found owing to inaccurate measurements of the house.

Nearly all homes are constructed of 9-inch brick, stuccoed, plastered, and have ventilated roofs. Basements are only found where a central heating plant is installed, and in most cases are just large enough to install the heating plant. For this type of building a heat loss measurement was worked out arriving at:

(Turn to Page 46)



Comparative fuel costs for typical Tucson residence

TRANSMISSION

O. L. Wrestler

H. V. Buffington

Pipe Pitting Studies

• **O. L. WRESTLER and H. V. Buffington, Los Angeles Gas and Electric Corporation; addressing Soil Corrosion Conference, Los Angeles, Calif., May 10, 1934; topic "A Study of Pitting Data on Bare Steel Pipe in Southern California Soil."—(Abstract):**

THIS study was based on approximately 3000 pit depth measurements made on underground steel pipe in and near Los Angeles; the lineal distance inspected was 3 feet of pipe; in most inspections only the deepest pit was recorded, but in about 300 examinations pits of lesser depth were also measured. In each case the age of the pipe was known.

The data were segregated according to:

1. Type of soil—sand, loam or clay.

2. Topography—well drained, poorly drained.

3. Electrical resistance of soil—low, medium, high.

4. Combinations of the above.

When the average depths of these deepest pits were plotted against age, in every case the curves showed increasing depths up to 12 years, and then decreasing values. Two explanations are offered for this result:

1. Some readings are too low, because the measurements could not be made from original surface on account of general corrosion.

2. The deepest pits were not included in the average, as they had become perforations and the pipe removed from the ground.

Fig. 1. illustrates these two conditions. Pipe sample (1) shows loss of original surface, (2) shows surface intact with pits partially through the wall, and (3) depicts perforations in pipe. It is obviously impossible to measure the true depth of pitting in samples (1) and (3).

A study of change of average depth of deepest pits, with change in area inspected, did not show any clearly evident relationship, although a trend was noticed whereby larger areas gave deeper pits.

It was pointed out that if the number of perforations on a pipe line are to be calculated, account must be taken of:

1. The ratio of number of pits deeper than average depth to total pits in any group. This will not necessarily be 50 per cent; actual count, in the case of the data studied, showed 40 per cent.

2. The effect on perforation rate of the shallower pits which exist at each inspection area; in other words, a less-than-deepest pit in one area may be deeper and perforate sooner, than the deepest pit in another area.

A study of economic life of any structure involves the accumulative maintenance cost, "d." The following expression of this quantity was submitted:

$$d = \frac{z\ y\ R\ h\ [f\ (T)\ ]^{1/a}}{(W)^{1/a}}$$

z = cost of each repair.

y = area of outside surface of the pipe, in square feet.

R = ratio of pits deeper than average to total pits.

h = factor to account for perforations from shallower pits.

$f(T)$ = function of time which expresses the increase of average pit depth with age, based on inspections of 1 square foot of surface.

W = wall thickness of pipe.

a = constant for the soil.

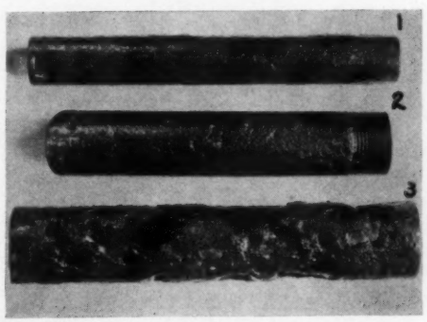


FIG. 1.

It was concluded that (1) loss of original surface must be considered in a study of life of pipe and (2) prediction of pipe life based on relatively short periods of observation may not be correct.

Use of X-Rays to Show Pipe Line Condition

• **RUSSELL J. LOVE, Southwest Welding & Mfg. Co., Inc., Alhambra, Calif.: addressing Spring Conference, Pacific Coast Gas Association, Technical Section, Los Angeles, March 23, 1934.—(Abstract):**

AN X-RAY picture is actually a shadowgraph of the object photographed. On the developed negative, lighter and darker areas are indications of non-uniform structure. A flat homogeneous piece of metal of uniform thickness will absorb X-ray energy evenly over the whole area exposed, and the picture of such a plate will be a uniformly blackened film. A similar piece of metal containing internal cracks, holes,

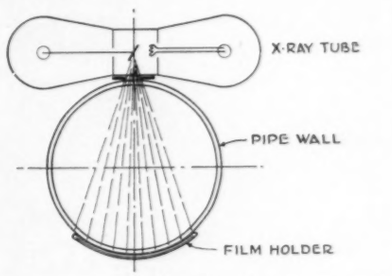


FIG. 1.

or foreign matter will register on the film according to the following principle: On the negative, darker areas indicate regions of less than average density, and lighter areas indicate regions of average or greater density. If a contact print or positive, is made from an X-ray negative, the principle is reversed.

Variations in thickness due to corrosion or erosion are also revealed by X-rays, which leads to one of the special applications of radiography to the gas industry—the examination of internally corroded pipe lines. When a line is suspected of being corroded internally, the conventional method of examination is to shut down the line, blow out the gas, and to remove sections or drill tell-tale holes. This is inconvenient and often cuts or perforates perfectly sound pipe. With X-ray inspection no shutdown is necessary, no harm is done to the pipe itself, and the chances of locating internal pitting are just as good as with mechanical sampling.

Fig. 1 shows the technique of radio-

graphing a closed circular pipe without putting the film or the tube inside the pipe. To obtain a picture of an area on the bottom of a horizontal pipe the tube is placed as close as possible to the top and the exposure is made through both walls. Because of the divergence of the X-rays from the focus, only a small area of the upper wall is exposed, but a relatively large area of the lower wall is penetrated. The film being held against the lower area, good definition of the contact area is secured, but the small exposed area of the upper wall has its "shadow" dispersed so widely as to be unrecognized on the film. Fig. 2 is a positive reproduction of a corroded area in a pipe line.

This same method is used for radiographing welded joints in pipe lines. The method is applicable to pipe diameters up to 3 or 4 feet, provided a sufficiently powered tube is used to penetrate twice the pipe wall thickness with a reasonable exposure time.

The penetrating power of X-radiation is dependent upon the density and thickness of material being examined, and upon the tube voltage; 100 KV radiation will penetrate about 1 inch of steel, 2 or 3 inches of aluminum, or about 6 inches of wood, with approximately the same amount of energy transmitted to expose the film. Under these conditions a tube current of 4 milliamps will give about 50 per cent blackening of the film in 10 minutes. Doubling the current will cut the exposure time in half. If a considerably lower voltage is used, however, no penetration would be obtained no matter how long the exposure, the steel absorbing 100 per cent of the energy. If, however, a higher voltage than 100 KV is used for penetrating 1 inch of steel, the extra penetrating power serves to reduce the time of exposure. With 200 KV and 4 milliamps, steel up to 3 inches thick can be examined in reasonably short exposure time. Above 250 KV, the increase in voltage is much less effective in increasing the penetration, and 300 KV penetrating 4½ inch steel is about the economic limit.

Radiography of existing pipe lines both for corrosion and for soundness of joints can be undertaken with portable X-ray apparatus at a cost comparing favorably with that of present inspection methods. The operating cost of a 200 KV portable X-ray machine, including operator and all charges on the equipment, is about $10 per hour. The number of pictures which can be taken per hour varies greatly, depending upon accessibility of job, assistance in setting up apparatus, exposure time required, etc. Southwest Welding and Mfg. Co. Inc. has found that from 3 to 5 pictures per hour can be taken on tanks in the shop. At least one, and often two pictures per hour are obtainable on most field work. On this basis, X-ray inspection of pipe lines could be undertaken if a series of pictures along an accessible line were desired, at a cost of, say $10 per location examined. This is about one-half the cost of present methods. For examining pipe lines with less than ⅜ inch wall thickness, a 100 KV portable apparatus can be used, costing approximately one-half as much to operate as the 200 KV equipment.

Flaws or variations in thickness equal to 1 or 2 per cent of the metal wall thickness can be discovered. The actual thickness of a plate or wall at any point can be measured, if access can be had to both sides. By means of stereographic exposures (two views taken from different points, the pictures being viewed with a stereopticon), the depth of a flaw beneath the surface can be estimated.

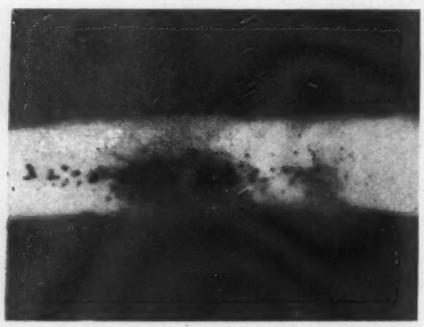


FIG. 2.

PLANT PRACTICE

Hydrogen Sulphide Resistant Materials

• J. M. DEVINE, C. J. WILHELM and LUDWIG SCHMIDT, Bartlesville, Okla., Petroleum Experiment Station, U. S. Bureau of Mines, in Technical Publication No. 531, American Institute of Mining and Metallurgical Engineers, New York Meeting, February, 1934; topic "Comparative Resistance of Certain Commercial Ferrous Materials to Corrosion by Gaseous Hydrogen Sulphide"—(Abstract):

UNDER certain conditions gas containing hydrogen sulphide must be handled. Heretofore no data have been available as to the possibility of constructing equipment of steels or ferrous materials more resistant to corrosion, at ordinary temperatures, than mild steel.

A comparative test was devised whereby ferrous materials could be evaluated for resistance to hydrogen-sulphide-bearing gas, under conditions of ordinary temperature, film of water on the metal surfaces, and controlled pressure. Specimens were enclosed in muslin sacks thoroughly wetted, and exposed to water-saturated gas containing approximately 3 grains of hydrogen sulphide per 100 cubic feet, and 1.0 per cent oxygen, in a container maintained at 17 pounds gauge pressure. At the end of 24 hours specimens were cleaned, dried and weighed, and the loss of weight calculated to average penetration of metal in inches per year. The penetration ranged from nil, for some of the chromium-nickel alloys, to 0.0454 inches per year for open-hearth steel.

Forty-seven representative ferrous materials, obtainable on the commercial market, were tested. They were obtained direct from the manufacturers, who furnished typical analyses of each material. The results listed below are to be considered as comparative only, and to be used as a guide to trial installations in the field, rather than as definite recommendations:

1. Steels containing 12 to 27 per cent of chromium showed the highest resistance to corrosion. The presence of nickel in these high-chromium steels did not affect their resistance.

2. Steels containing approximately 5 per cent of chromium showed comparatively high resistance, but somewhat less than that of the high-chromium steels.

3. Nickel cast iron was indicated as having resistance superior to all other materials tested, except those mentioned in paragraph 1 and 2.

4. The remaining materials tested were attacked comparatively rapidly. These may be divided, however, into a "more resistant group" and a "less resistant group," as follows:

(a) More resistant group: Steels containing 0.50 to 5.00 per cent of nickel; copper-molybdenum steel; steel containing 0.65 to 1.00 per cent of chromium; copper-bearing steel; electric furnace iron; and wrought iron (hand-puddled).

(b) Less resistant group: Ordinary Bessemer and open-hearth steels; medium carbon steels; wrought irons; plain cast iron; and steel containing 2 per cent of silicon.

Method for Studying Reforming Results

• LEON J. WILLIEN, operating gas engineer, Byllesby Engineering and Management Corp., Chicago, Ill.; addressing A. G. A. Joint Conference of Production and Chemical Committees, New York, N. Y., May 21, 1934; subject "Proposed Method for Studying Results of Reforming Oil, Refinery Oil Gas and Natural Gas."—(Abstract):

WHEN using bunker oil or heavy oils in the manufacture of carburetted water gas, it is common practice to pass a portion of the oil through the fuel bed, either with or without steam. The same is true when reforming refinery oil gas or natural gas.

L. J. Willien

To determine the factors in connection with oil reforming it is essential to know the gallons of oil used per M of gas made in passing through the fuel bed. While the amount of oil passed through a fuel bed can be metered, the amount of gas made cannot be metered. The same is true for refinery oil gas or natural gas. Usually steam is passed through the fuel bed with the oil, oil refinery gas or natural gas, producing a mixture of reformed gas and blue gas. Any study therefore, of what takes place in the fuel bed involves the determination of the percentages of blue gas and reformed gas in the mixture.

The author conceived the idea of calculating the gallons of oil or cu. ft. of hydrocarbon gas used per M of final gas produced by means of a hydrogen balance. The idea is based upon the theory that all the hydrogen in the oil or hydrocarbon gas used is recovered in the final gas as free and combined hydrogen. The pounds of hydrogen as free hydrogen and combined hydrogen per M of final gas divided by the pounds of hydrogen in a gallon of oil used or per M of the original hydrocarbon gas should give the gallons of oil used per M of final gas or the M cu. ft. of final gas produced per M of the initial hydrocarbon gas used.

The pounds of hydrogen per gallon of oil used can be determined from the A.P.I. gravity of the oil. This relation, as well as the pounds of hydrogen per gallon, is shown in the accompanying chart.

The pounds of total hydrogen—free and combined—in the initial or final gas can be calculated from an analysis as follows:

Cu. Ft. per M of				
Illuminants	×	.0120*	=	#H_2
CH_4	×	.0108	=	#H_2
C_2H_6	×	.0161	=	#H_2
C_3H_8	×	.0219	=	#H_2
C_4H_{10}	×	.0274	=	#H_2
H_2	×	.0053	=	#H_2

*Assumed as 75 per cent C_2H_4 and 25 per cent C_6H_6.

If any tar is produced the results obtained by this should be low because of the hydrogen in the tar. The amount of tar produced when passing oil or hydrocarbon gas through an incandescent fuel bed is negligible. Tar contains approximately 5 per cent hydrogen by weight.

This method requires:

1. An analysis of the reformed or final gas.

2. The A.P.I. gravity of the oil used or,

3. An analysis of the original hydrocarbon gas.

From an analysis of the reformed or final gas, the following can be calculated.

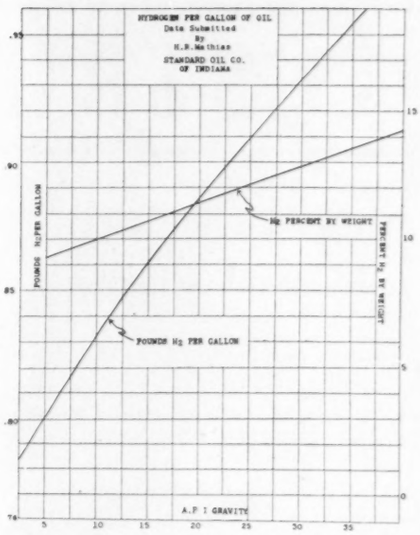
1. The percentage and composition of the oil gas produced.

2. The B.t.u. per cu. ft. of the oil gas.

3. The percentage of hydrogen formed by the blue gas reaction. The amount of hydrogen thus formed subtracted from the total free hydrogen in the gas will represent the percentage of free hydrogen from the oil or initial hydrocarbon gas used.

The percentage of hydrogen formed by the blue gas reaction can be calculated by Pexton's Method which is described in American Gas Practice by Morgan, Second Edition, Volume 1, page 478-479. It is based upon an oxygen balance. The total combined and uncombined oxygen in carburetted water gas comes from two sources—air and steam. The oxygen due to air is approximately ¼ of the nitrogen content, and if this is deducted from the total combined and uncombined oxygen in the carburetted water gas, the resultant oxygen must be accompanied by twice its volume of hydrogen in the blue water gas.

While the author agrees with Pexton that air and steam are the two sources of combined and uncombined oxygen, he does not believe that any of the uncombined oxygen comes from the steam, but rather that it comes from air. He prefers, therefore, to consider that all of the uncombined oxygen is due to air rather than consider it as ¼ the nitrogen. The determination of oxygen in a gas analysis is more accurate than the determination of nitrogen. Usually the nitrogen is determined by difference and includes all errors that may be made in a gas analysis. The determination of combustion products should not be omitted if the proposed hydrogen balance method is used in connection with the total final gas. It is known that a water gas set is filled



with combustion products at the beginning of the gas making period and that these combustion products are present in the finished gas. When passing oil through the fuel bed during a backrun or downrun, the gas should not contain any combustion products as this operation follows the uprun.

The author modifies Pexton's Method for determining the hydrogen due to the blue gas reaction, by taking the sum of the CO_2 and one-half CO and multiplying it by 2. In case combustion products are present, he determines the amount of CO_2 in the combustion products and subtracts it from the total CO_2. The amount of CO_2 thus found would be that due to the blue gas reaction. The percentage of hydrogen due to the blue gas reaction subtracted from the percentage of hydrogen shown by the gas analysis will give the hydrogen from the oil or hydrocarbon gas. The percentage of oil gas will then be the sum of the hydrogen from the oil or hydrocarbon gas, illuminants, methane and ethane. From the composition of the oil gas thus determined, its B.t.u. can be calculated.

Uinta Pipe Line Co. Protecting Line to Salt Lake City

The Uinta Pipe Line Co., Rock Springs, Wyo., has under way a $300,000 rehabilitation program which will include protective measures on the company's 200-mile line from Baxter Basin, Wyo., and Hiawatha Dome, Colo., to Salt Lake City, Utah. The pipe, which has been in the ground approximately six years, is being uncovered from a depth of 5 feet, and given protective treatment to prevent corrosion due to unfavorable soil conditions. C. R. Hetzler is vice-president and general manager of the Uinta Pipe Line Co., a subsidiary of the Western Public Service Corp., Findlay, Ohio.

DISTRIBUTION

Symposium on Causes and Control of Dust

● LOUIS SHNIDMAN, Rochester Gas and Electric Corp., Rochester, N. Y.; addressing A. G. A. Joint Conference of Production and Chemical Committees, New York, N. Y., May 21, 1934; topic "The Dust Problem"—(Abstract):

THE problem of dust in gas is one that has been forcibly brought to the attention of the gas industry in the past few years, due in a large degree to the rapid increase in the use of automatic appliances requiring continuous and satisfactory performance. The number of small orifices thus brought into use make it mandatory that dust or other foreign matter in the gas be either removed, or the equipment be so designed as to permit proper functioning in the presence of this dust.

To obtain information regarding this problem, the author prepared a comprehensive questionnaire which was sent to some 60 engineers of the larger companies in the natural and manufactured gas industries. Some 48 replies were received, and are analyzed in this report.

Origin of Dust

The causes of dust formation are essentially the same in natural and manufactured gas, as shown in the replies. These may be divided into primary and secondary factors.

The primary factors include, first, corrosion as a result of the presence of water vapor, oxygen and hydrogen sulphide in the gas; second, foreign matter left in the mains during construction; third, mill scale. The secondary factors include the use of oxide boxes for the removal of hydrogen sulphide, organic matter present in the gas, and sand picked up from the well.

In the natural gas industry engineers were quite satisfied that dust troubles generally occur when changing a system from manufactured to natural gas, the pre-formed dust becoming mobile when the gas picks up the dry foreign and accumulated material and carries it through the system.

Nature and Amount of Dust

The analysis of dust from natural and manufactured gas distribution systems indicated that iron in the form of iron oxide accounted for 64 to 70 per cent; loss on ignition 18 to 24 per cent; silica, 5 to 6 per cent; with small amounts of moisture, alumina, calcium, and other minor constituents. In general the nature of dust was similar in natural and manufactured gas systems.

Few screen analysis tests were reported. In general the greater part of the deposit or dust passed a 30-mesh screen, while only a small percentage would pass a 325-mesh screen. Few organizations or companies studied particle size or the microscopic structure of these dusts. Some special investigations that were conducted indicated that there were particles less than one micron (less than 1/25,000 of an inch).

Fully 75 per cent of the companies answering the questionnaire never determined the dust content of their gas, either due to cost, absence of need, or simply due to the lack of a satisfactory method.

The methods employed in general were crude and qualitative rather than quantitative in nature. Some used the change in dust accumulation in meters as an index to the dust troubles, others used dust traps, i.e. rate at which dust traps filled up, others used the greased stick, etc. Relatively few used the quantitative Brady gas filtration method or the so-called Carnegie Steel Method for dust determination in gas.

Effect or Action of Dust in Gas

All engineers agreed as to the harmful effects of dust in gas. They found that dust caused trouble in transmission lines, distribution mains, pumping equipment, compressors, regulators, meters, industrial equipment, filters, automatic appliances, and especially pilot lights. Engineers in both the natural and manufactured gas industries stated that dust accumulated most generally in meters and regulators in the distribution system, appliance orifices, compressor stations, transmission lines, district governors, dust traps, etc.

The collection of dust in transmission lines and in distribution systems has a marked effect on the capacity of such systems. One engineer related how the capacity of his local transmission lines was reduced as much as 20 per cent.

Methods of Remedying Dust Troubles

Dust present in a natural or manufactured gas system has been remedied by several methods. The dust may be removed from the system, or the dust may be transformed into such a condition that trouble will be reduced to a minimum. Questionnaire replies showed that in the distribution of natural gas through long transmission lines the dust picked up by the gas is removed before such gas is placed in distribution systems. In such cases the practice is to install oil scrubbers at the entrance to city gates where the gas is to be distributed. A diagram of a typical oil scrubber is shown in Fig. 1. It consists of a tower wherein the dust-laden gas is brought intimately in contact with oil and a means of separating the oil and oil-coated dust from the outgoing gas. The method of operation is as follows: Gas under pressure entering the side of the

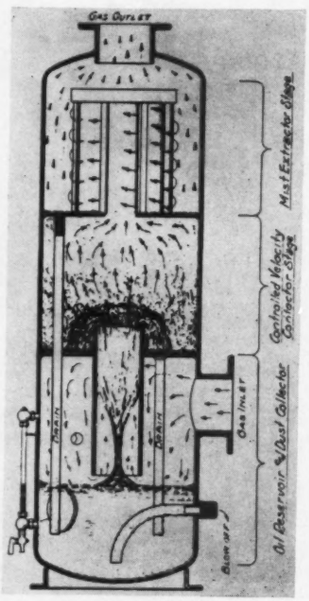


FIG. 1. Oil Scrubber.

scrubber depresses the level of oil in the reservoir which causes the oil to rise in the contactor tube, mixing with the gas in a swirling vortex. This action brings the gas in intimate contact with the oil, where the dust particles are wetted or coated with oil. The gas then passes into the mist extractor where the fine particles of oil are removed, the purified gas leaving at the top. Run-down drain pipes are provided for returning the oil to the reservoir where it is used over again.

This practice eliminates the entrance of foreign dust with the gas so that the only dust encountered is that already present in the distribution system. Remedying dust troubles in distribution systems utilizes the second principle mentioned above, viz.: converting the dust into such a form that it no longer causes dust troubles. To accomplish this end,

water vapor or oil vapor and, in some cases, both are introduced into the mains in order to form a film around the dust particles and on the interior surface of the mains to cause such dust particles either to conglomerate or adhere to the surface of the main.

The control of the dust problem has also been attacked from an entirely different angle, viz.: the design and development of a type of orifice that will function continuously when dust is present in the gas. This solution of the problem is still in the experimental stage.

Wide-Range High Pressure Meters

• GEORGE MOCK, Washington Gas Light Co., paper entitled "Measuring of High Pressure Gas under Widely Varying Loads," Contributed to Progress Report of Sub-Committee on Meters and Metering (L. H. East, Rochester Gas & Electric Corp., Chairman); presented at 11th Annual A. G. A. Distribution Conference, Detroit, April 10, 1934.—(Abstract):

THE rapid growth of many cities in the past 15 years, the increased demand for gas in suburban communities, and the merging of suburban companies with those of the larger cities have brought about the abandonment, in many instances, of the smaller manufactured gas plants and the installation of high pressure transmission mains from central plants to the suburban companies' territories. The demands on these lines may vary from four or five thousand cubic feet per hour to 50,000 or more.

Measurement of gas under these conditions necessitates consideration of the following factors: Maximum and minimum rate of flow, variation of rate of flow over given periods, pressures at point of metering during maximum and minimum loads, and permissible loss of pressure through meter. It should be noted that the loss of pressure through the meter is important in this phase of transmission, because of the relative working pressures used. The pressure loss may be a large percentage of the total pressure on the line, and would reflect directly as an increase in the cost of pumping.

The characteristics of various meter installations, such as their range, accuracy, size, pressure, loss, and reliability and simplicity, must first be considered, after which such factors as initial costs, methods of correcting readings, and cost of attendance and supervision must be determined before the distribution superintendent or engineer may reach a decision as to the installation that should be made to best handle a given situation. The three types of meters available are the positive displacement rotary, the orifice, and the Venturi.

The positive displacement rotary meter will measure a flowing gas within a range of 10 to 150 per cent of its rated capacity, although it is not recommended that an overload be permitted for any long period. For high pressure metering the pressure loss through this type of meter is practically negligible. It is not necessary to house this type of meter, but it is considered good practice to do so, and also keep it at a reasonably uniform temperature. Attention must be given to its lubrication and cleanliness or the slippage factors supplied by the manufacturers will not be correct.

In order that this meter can be used to measure widely varying flows, pressure—volume—temperature—time idicators or integrators are required. To arrive at the standard volume of gas passed, temperature, pressure and slippage corrections must be made to the volume indicated by the meter. Demand requirements for any period can also be obtained with this meter. In comparison with inferential meters, the initial investment for the positive displacement rotary meter is large, and a greater space is required for its installation. However, it can be used to advantage where there are pulsations in the line, whereas the inferential types cannot.

Considering the orifice meter, for any given orifice plate or disc, the minimum flow is dependent upon the lower readable limit of the differential gauge and the lowest pressure carried. Differential gauges register from maximum to 8 per cent of the maximum, i.e., a 2½-inch differential gauge has a lower readable limit of 0.2 inches. If the accuracy of the orifice at the maximum rate of flow is to be within 1 per cent, the maximum differential in inches of water should not exceed the maximum absolute pressure in pounds per square inch on the up-stream side. If the accuracy is to be within 2 per cent at maximum flow, the differential should not exceed twice the absolute up-stream pressure. The upper limit of flow is governed by the accuracy desired. It might be pointed out that an error at the maximum flow may be of such magnitude that it would amount to a large proportion of the minimum flow. Then the duration of peak and minimum loads must be considered.

The pressure loss through an orifice meter will vary from 73 to 90 per cent of the differential, depending upon the location of the pressure taps and the ratio of the orifice diameter to the pipe diameter. Variable orifice meters which give a wide range of flow are now available, but are rather costly.

For the well designed Venturi having a long recovery cone, the minimum flow is dependent, as in the case of the orifice, on the lower readable limit of the smallest differential gauge, whereas, the upper limit is dependent upon the maximum limit of the largest differential gauge (usually a 100-inch), and the maximum pressure. It is accurate within 1 per cent.

The pressure loss through the Venturi will vary from 11 to 25 per cent of the maximum differential. Unlike the orifice, it is not affected greatly by the change in density of the gas due to a high differential inasmuch as the gas can only expand in the direction of flow. A Venturi tube, being more difficult to fabricate, is more expensive than an orifice.

It is apparent from computations that a Venturi meter has approximately 1.6 times the range that a single orifice of the same throat has and that its pressure loss is about ¼ to ⅓ that of the orifice.

NEW BUSINESS

The New Deal In Gas Water Heaters

• C. GEORGE SEGELER, Engineer of Utilization, American Gas Association; addressing New Jersey Gas Association, Trenton, N. J., March 23, 1934—(Abstract):

FROM the central vantage point of A. G. A. Headquarters there can be seen a sudden quickening of interest in the water heating load.

The modern requirement is not so much an unlimited quantity of hot water, but rather a supply ready for use at any time. Data on typical requirements, together with application of elementary engineering principles, makes it possible to advise the consumer as to the size and type best fitted to his needs.

Considerable attention is now being given to the relative merits of slow recovery and quick recovery heaters. Should there be a large tank, a small tank, or no tank at all? A big tank will store large quantities of water, but costs more to buy and maintain at heat than a small tank. Therefore the latter, if able to recover heat quickly, may be as good or better for certain jobs.

Another new development is a 12-gallon storage tank, heavily insulated, keeping water at 180 degrees. This water is automatically mixed with cold

water to give the desired temperature. The burner is similar to that in a gas refrigerator.

A new development in the instantaneous type (no storage tank) is electric pilot mechanism which reduces standby pilot loss. A disadvantage of the instantaneous type, when there are a large number of relatively small demands, is the hot water left behind in the coils.

There is also the type in which the production of hot water can be controlled. One modification is set, on installation, with the desired gas consumption at the burner and a flue orifice to give proper draft. Another, controlled by the consumer, has a set of burners in which one or more elements can be used.

A still further variation is the limited type, whereby a strictly and definitely limited amount of water may be heated, thus enforcing definite consumption and involuntary economy.

When considering efficiency there is involved, besides the generally realized flue and pilot loss, a considerable wastage due to uninsulated and unnecessarily large hot water pipes. A ¾-inch pipe 33 feet long wastes a gallon of water every time the faucet is used, increasing the water heating bill materially. It is recommended that ⅜-inch copper tubing be used instead of iron pipe, with an individual line direct from the heater to each faucet.

It is also recommended, as an aid to economy, that for the average home the water temperature be set at 130 degrees.

The selection of the right type and size of water heater needs a thoroughly trained sales personnel, and it is recommended that sales be made by a special water heater division, staffed by both salesmen and sales engineers, and modeled along the lines of a typical house heating department, in which engineering facts would be used as the basis for determining the right size of water heater, recommendation of the installation practice, estimate of the water heating bill and analysis of the competitive situation.

Southern Sales Trends and Opportunities

● **W. R. COLLIER, Southern Natural Gas Corp., Birmingham, Ala.; addressing the Southern-Southwestern Regional Gas Sales Conference, Memphis, Tenn., March, 1934; topic "Some Southern Sales Problems"—(Abstract):**

AMONG outstanding sales campaigns in Southern territory during the past year was the radiant heater activity of Consolidated Electric & Gas Co. properties in Georgia and Alabama. In addition to radio, newspaper and other recognized sales promotional agencies the campaign made use of specially designed trucks, manned by salesmen dressed in striking uniforms. From these trucks demonstrations of radiant heaters were given in front of prospect's homes.

W. R. Collier

In New Orleans a cooperative campaign on ranges was carried on for one week, called the "Friday the 13th" sale. Ranges were sold for 13 cents down, 13 per cent discount, and 13 months to pay, with the campaign opening on Friday, January 13. Sales for the week were 100 per cent above former average sales.

Rental of gas merchandise is receiving much thought in the South. Atlanta Gas Light Co. has been renting gas storage water heaters of 20-gallon and 30-gallon capacity for $1 per month, and during the past six months has placed 851 waters heaters in service on this basis, with total estimated yearly revenue of $20,000 for gas sales and $10,212 for yearly rentals. The plan has helped to offset low electric flat rates for water heating, and has added many new water heating customers.

The same company is renting furnace conversion burners with good results. A number of burners on hand at the start of the past heating season have been put on rental for $2 a month, the rental to be credited on sales price of the burner (installed price $144) at the customer's option. Although a minimum of advertising was used for the rental plan results were excellent. Leads from advertising were followed up by two special salesmen and 21 regular salesmen with result that 96 jobs were rented and 60 sold in three months. Gas sales from these jobs should total $13,000 and rentals $2,300 per year. Rental promotion will probably be launched heavily in the summer of this year. It is expected to add 1,000 conversion burner jobs through rentals and sales in Atlanta for the coming season.

Analysis of customer's requirements must be carefully made if jobs are to stay sold, and adequate service must also be rendered after the sale. This is particularly true in commercial and industrial fields.

In the South restaurants are coming to gas service fairly rapidly; there is a distinct market for gas space heating with restaurants in addition to water heating and cooking.

The steam boiler load for such users as the small laundry, dry cleaning and pressing establishments should receive more attention. Direct conversions from coal-fired boilers for these customers require special care since the average small vertical boiler presents limited combustion surface to the action of gas flames, with resultant low combustion efficiencies and high stack temperatures. Proper study of customer's needs will sell these jobs and keep them sold.

Another field where special service is needed to hold jobs after the sale is completed is that of bakeries. Service men should be available for several days in newly sold plants to familiarize operators with proper use of gas.

In the large industrial field keeping customers sold is a function of proper construction and installation detail and proper follow-up service. Full automatic installations for boilers should be urged, to eliminate inefficient manual operation. Studies of several non-automatic boiler installations during the past year have shown as high as 30 per cent more gas used on manual operation than would have been used on automatic, due entirely to inefficiency of the fireman.

In selling gas for direct process work such as metallurgical or ceramic applications the problem is highly technical and demands that the gas company engage expert advice or have prospective installations carefully checked by responsible burner manufacturers before attempting to take the business.

C. I. Wall Wins Promotion In West Texas Gas Co.

C. I. Wall, until recently district manager for the West Texas Gas Co., at Plainview, Texas, has been placed in charge of appliance sales and business development for the company's entire system.

Mr. Wall is succeeded at Plainview by Marion F. Peters, manager of the company's Midland, Texas, office since 1928. The West Texas Gas Co. headquarters in Lubbock, Texas, and is a subsidiary of the Southwestern Development Co., Independence, Kan.

First Aid Course Completed By Dallas Gas Co. Employees

A 10-hour advanced course in industrial first aid sponsored by the American Red Cross was recently completed by 22 Dallas Gas Co. employees. The course was conducted by D. H. McAnnally, safety engineer for the city of Dallas. Sessions were held in the Dallas Gas Co. building.

Pacific Coast Gas Association

Managing Director: Clifford Johnstone
Association Headquarters:
447 Sutter Street, San Francisco

President: George P. Egleston
General Manager, H. R. Basford Co.,
San Francisco

Speaking Contests Again Planned for Convention

R. E. FISHER, chairman of the Public Relations Section, has announced that the Section will continue the practice of holding two public speaking contests at the Convention, one for men and one for women.

R. E. Fisher

The Men's Public Speaking Contest will be in charge of W. A. Worthington of the Pacific Gas and Electric Co., San Francisco, and the Women's Contest in charge of Miss Clyda Weems, chairman of the Women's Committee, San Joaquin Light and Power Corp., Fresno.

The rules governing the contests have been prepared and issued to company members with the request that company contest directors be appointed.

All gas company employees are eligible with the exception of executives and department heads and also with the exception of those who represented their companies in the 1933 contests.

The subject for both contests this year will be "The Importance of Load Building" (to the consumer, employee, and stockholder).

Speeches should be not less than three minutes or more than five minutes in length. Speakers may use notes.

The first prize in each contest will be $50 and the second prize $25. In addition, of course, all speakers winning company eliminations will be given a trip to the Convention by their companies.

Heads B. C. Electric Merchandise Dept.

The gas and electric merchandise departments of the British Columbia Electric Railway Co., Ltd., Vancouver, B. C., Canada, have been amalgamated and are now under the direction of Wm. C. Mainwaring, formerly electric merchandise manager. Mr. Mainwaring joined the B. C. Electric Railway Co. as electric merchandise manager in 1932. He was for many years district sales manager in Vancouver for the Northern Electric Co.

Paul B. McKee

E. L. Hall

J. Earl Jones

Geo. L. Myers

Some Northwesterners Who Will Help to Make Portland Meetings Outstanding

Northwest Conference Program Ready

THE program for the Association's Northwest Conference, to be held in Portland on June 21 and 22, will bring out all the latest information on sales and merchandising campaigns, competitive threats, new appliances, and new uses for gas. The conference will discuss load building in all its phases and make plans for the correlation of utility, manufacturer and dealer activities through which to increase the sale of gas appliances to the mutual satisfaction of all concerned.

All meetings will be held in the Portland Gas and Coke Co.'s auditorium on the third floor of the Public Service Building, and no hotel headquarters will be maintained.

Geo. P. Egleston, President of the Association, will preside at the meetings. The opening session will be called to order at 9:30 A. M. on Thursday, June 21, and will proceed immediately to a discussion of the domestic cooking situation. The afternoon session on the first day will be devoted to a discussion of load building and competition in the water heating, house heating, and refrigeration fields, and in the evening the operating men will meet to talk over production, distribution and servicing problems under the leadership of Frank Hawks of Tacoma, chairman of the Association's Production Committee. Frederic A. Hough of Los Angeles, chairman of the Association's Technical Section, will use this opportunity to outline some of the important investigations now being made by Technical Section committees.

The morning session on Friday, June 22, will be devoted to stock taking in the commercial and industrial fields, followed by discussions of credits and collections, and advertising. The afternoon session will be devoted to dealer cooperation with particular reference to what has already been accomplished in this direction. In the evening there will be a gas industry dinner at which utility men, manufacturers and dealers will join together in an inspirational program to cement their union into a coordinated group to promote the use of gas and gas appliances.

On both Thursday and Friday there will be luncheon meetings addressed by prominent speakers. All sessions will be informal and no long papers will be read. Each subject will be introduced by a discussion leader after which the subject will be open for general discussion. Among the speakers and discussion leaders will be Paul McKee, president of the Portland Gas and Coke Co.; Hilmar Papst, vice-president and general manager, Portland Gas and Coke Co.; J. Earl Jones, commercial manager, Seattle Gas Co.; E. J. Ludeman, commercial manager, Washington Gas and Electric Co.; E. L. Hall, operating manager, Portland Gas and Coke Co.; E. L. Payne, general manager Payne Furnace and Supply Company, and Chairman Manufacturers Section, Pacific Coast Gas Association; Frank Moon of Los Angeles Gas and Electric Corp.; Pierre Vinet of Coast Counties Gas and Electric Company, Chairman Commercial Section, Pacific Coast Gas Association; Frank Hawks, plant superintendent, Washington Gas and Electric Co.; A. O. Leach, industrial engineer, Portland Gas and Coke Co.; C. R. Miller, super-

GAS COMPANY OPERATIONS FOR THE STATES OF CALIFORNIA, ARIZONA, NEVADA, OREGON AND WASHINGTON AND THE PROVINCE OF BRITISH COLUMBIA

First Three Months of 1934 Compared with Similar Period in 1933

BELOW appears the summary from a statistical statement prepared by the Pacific Coast Gas Association, comparing gas company operations for the first three months of 1934 with the similar period in 1933, for P.C.G.A. territory.

The most noticeable feature of this quarterly report is the decline in domestic sales and revenues. This was not occasioned by economic conditions but was due to a winter which had all the characteristics of summer, making house heating unnecessary for the greater portion of the period. This effect was augmented in Arizona by the introduction of natural gas in Phoenix and Tucson during January. Economic conditions are better reflected by commercial and industrial sales which in California showed a large increase over 1933. A portion of this increase, however, is due to the sale of large quantities of surplus gas to oil refineries at very low rates. Revenue decreases also reflect rate reductions in California, Oregon and Arizona.

Detailed figures for the various states of the Association area are available at P.C.G.A. headquarters.

	1933	1934	Per Cent Change
Production—M c.f.			
Water Gas	706,563	613,434	
Coal Gas	288,504	124,998	
Oil Gas	1,369,054	955,910	
Coke Oven Gas	322,603	468,893	
Butane Gas — 550 B.t.u.	79,487	63,918	
Natural Gas Purchased	41,861,886	42,643,843	
TOTAL	44,628,097	44,870,996	+0.5%
Active Meters—March 31			
Domestic	1,519,632	1,545,307	+1.7%
Commercial and Industrial	71,440	74,875	+4.8%
TOTAL	1,591,072	1,620,182	+1.8%
Sales—M c.f.			
Domestic	22,444,759	18,469,672	−17.7%
Commercial and Industrial	12,586,908	17,254,123	+37.1%
Electric Generation	3,279,450	3,804,561	+16.0%
TOTAL	38,311,117	39,528,356	+3.2%
Gross Revenue			
Domestic	19,478,422	16,555,121	−15.0%
Commercial and Industrial	3,926,061	4,461,434	+13.6%
Electric Generation	391,786	468,694	+19.6%
TOTAL	23,796,269	21,485,249	−9.7%

intendent of utilization, Portland Gas and Coke Co.; Norbert Fratt, credit manager, Seattle Gas Co.; B. H. Parkinson, commercial manager, Portland Gas and Coke Co.; A. C. Joy, manager publicity and advertising, Pacific Gas and Electric Co.; H. M. Crawford, general sales manager, Pacific Gas and Electric Co.; Douglas Buckler, supervisor of advertising and publications, Southern California Gas Co., and Chairman Publicity and Advertising Section, Pacific Coast Gas Association; C. A. Swigart, Trade Relations Representative, Pacific Coast Gas Association; and A. F. Rice, sales manager, H. R. Basford Co.

Geo. L. Myers of the Portland Gas and Coke Co., well-known to all Association members, is in charge of arrangements.

Gas Range Committee Seeks Information

J. Earl Jones, commercial manager of the Seattle Gas Co. and chairman of the Commercial Section's Gas Range Committee, is engaged in making a survey of the gas range situation on the Pacific Coast. In an effort to get complete and authentic information Mr. Jones has forwarded a questionnaire to the sales managers of all Pacific Coast gas companies.

While questionnaires are unpopular and ordinarily discouraged by the Association, it is very desirable in this case that the questions be answered carefully and returned promptly to Mr. Jones.

F. H. Bivens

N. R. McKee

F. H. Bivens Retires; N. R. McKee Elected So. Counties Vice-President

RETIREMENT of F. H. Bivens from the vice-presidency of the Southern Counties Gas Co., Los Angeles, Calif., was announced last month by F. S. Wade, president of the company. Mr. Bivens is retiring because of ill health and is now convalescing from a protracted illness at his Long Beach, Calif., home. Norman R. McKee, general purchasing agent for Southern Counties, has been elected vice-president in charge of sales and allied activities, continuing also in charge of the company's purchasing department.

Mr. Bivens, who remains a member of the Southern Counties board of directors, has been active in the company since its inception in 1911 and has more than a quarter of a century of splendid service to the utility industry to his credit. His activities with Southern Counties Gas Co. have included branch managerships in each of the company's eight districts, followed by a period as general agent, and since 1928 as vice-president in charge of public activities and sales. In addition to his services with Southern Counties Mr. Bivens a number of years ago installed gas plants in Mexico City and in Meriden, Yucatan. For many years he has filled an active place in Pacific Coast Gas Association affairs, serving several terms on the board of directors and as president of the organization in 1930.

Mr. McKee comes to his responsible position with Southern Counties from a long period of service with the company. He has been a general purchasing agent since 1924, prior to which time he served for six years as sales engineer and for two years, from 1916 to 1918, as manager of the important Santa Monica district. Mr. McKee was a member of the Pacific Coast Gas Association board of directors from 1926 to 1928, and has participated in Association affairs for many years.

California Commission Counsel Called to Washington

Arthur T. George, for five years chief counsel for the California Railroad Commission, has been appointed attorney on public utility matters for the National Recovery Administration. He has resigned from the California Railroad Commission, and is leaving for Washington immediately to assume his new duties.

COMMITTEE:
DOUGLAS BUCKLER...SO. CALIF. GAS CO.
J. EARL JONES.....SEATTLE GAS CO.
A. C. JOY (CHAIRMAN).....P. G. & E.
D. L. SCOTT.....L. A. G. & E. CO.
PIERRE VINET.....C. C. G. & E. CO.

1934 P·C·G·A·

HEADQUARTERS:
PACIFIC COAST GAS ASSOCIATION
447 SUTTER STREET, SAN FRANCISCO

GEO. P. EGLESTON, PRESIDENT
CLIFFORD JOHNSTONE, MNG. DIRECTOR

CO-OPERATIVE LOAD-BUILDING MONTHLY NEWS ···· AND VIEWS

TECHNICAL NEWS REPORT ··· JANUARY TO APRIL

Representing an actual space value of thousands of dollars and importantly supplementing our trade journal advertising, thirty-two technical articles on gas utilization were published during the first quarter of 1934, as a result of activities of our P.C.G.A. Technical News Bureau.

HOTEL and RESTAURANT PUBLICATIONS

Western Restaurant: Ambassador Hotel Kitchen is largest on Coast • Gas Cooking and Baking in Globe Dairy Lunch and Coffee Shops, Los Angeles • Gas-fired Cooking and Water Heating, Paris Inn • Gas Cooking at Perino's French-Italian Restaurant • Know Your Cooking Equipment—Burner Regulation and Adjustment • Club Cotton—Another Hit for Coon Chicken Inn, Seattle.

Western Hotel Reporter: Gas Cooking in Efficient Culinary Department of Ambassador Hotel.

Pacific Coast Record: Gas-fired Steam Boiler Plant and Kitchen Equipment, Biltmore Hotel • Gas Installations at Arrowhead Springs Hotel • Rejuvenated Beverly Hills Hotel.

Pacific Coast Chef: Fuel Comparisons—Relative Costs and Efficiency of Gas and Oil Firing • Bernstein's Fish Grotto, Los Angeles • Efficiency in the Kitchen — Burner Regulation and Adjustment • The Aurora Tavern, Seattle.

Keeler's Pacific Hotel Review: Blodgett Bake Oven • Gas-fired Cooking, Heating at New Los Angeles County Hospital.

Hotel News of the West: Russian Samovar, Unique Seattle Restaurant.

MACHINERY, FOUNDRIES, STEEL

Western Machinery & Steel World: Development of Diffusion Gas Firing for Forging and Industrial Heat Treating • Large Gas-fired Stress-relieving Oven, C. F. Braun & Co., Alhambra, Calif. • Automatic Control for Gas-fired Boilers.

BAKERIES

Pacific Coast Baker: Model Bake Shop of Robert I. Steen, Inc. • Proper Firing Will Secure Uniform Heat Distribution—Tests in San Francisco French Bakery • Positive Control of Baking Factors at Safeway Plant.

LAUNDRIES, DRY CLEANERS

Pacific Laundry & Dry Cleaner: Gas-fired Steam Boiler Plant of Community Laundry, Los Angeles • Boiler Plant Efficiency—Combustion Tests, Galland Mercantile Laundry, San Francisco.

ARCHITECTS, ENGINEERS, BUILDERS

Architect & Engineer: Gas Heating and Cooking Equipment, New Los Angeles County Hospital • Automatic Control of Gas-fired Boilers.

FACTORIES

Pacific Factory: General Electric's New Line of Gas Furnaces.

DAIRY PRODUCTS

Pacific Dairy Review: Gas-fired Boiler in Valley Dairy.

PLUMBERS, APPLIANCE DEALERS

Western Plumbing & Heating Journal: Gas-fired Steam Plant, Highbourne Gardens Apartments, Hollywood • Burning Gas in Water—Perfection of Liquid Heating with Immersion Torches • Hot Water Systems for California Residences.

Watch this page each month for down-to-date load-building news

MEASUREMENT and CONTROL

Proposing a Standard Gas Sample for Checking Gravity Measuring Instruments

By GUY CORFIELD

Los Angeles Gas and Electric Corporation

PROPOSAL is made in the following discussion that a standard gas be used by companies in the California area for checking gravity measuring instruments. Mr. Corfield's paper was presented before the Southern California Meter Association on March 22, 1934, following which the proposal was given further consideration by the Association's Standards Committee. Upon the Standards Committee's recommendation the proposed method was adopted at the S.C.M.A. meeting May 24. Discussion at this meeting is summarized on the next page.

Guy Corfield

Advantages urged for the standard gas sample method have equal application in other sections; hence the procedure now being instituted in California will be of general interest to *Western Gas* readers.

THE enormous quantities of gas measured daily in this area by orifice meters makes the determination of specific gravity of vital importance. This can be readily realized when one considers that a mistake of one "point" in the second decimal place makes an error of approximately 1 per cent in the calculated gas volume. For this reason a great deal of attention is paid to gravity instruments, not only by those responsible for the actual measurement of gas, but also by inventors and manufacturers of instruments used for this purpose.

As a result of this intensive attention to detail and continuous striving for accuracy, many controversial situations arise in which differences of gravity are found where no difference could seemingly exist, and each party is sincere in his belief in his own figures. It is a matter of experience that such controversies are very difficult to straighten out, if indeed they ever are settled to the satisfaction of both parties, and considerable time is usually spent to no great advantage.

There are a number of reasons why two measurement men can have a difference of opinion as to the gravity of a certain gas with entire sincerity on each side. Some of the more important reasons are as follows:

1. They may suspect each other's apparatus, because such apparatus is subject to personal errors and dependent upon auxiliary equipment which may be in error.

2. They may be using different types of apparatus, employing a variety of principles, using different means of temperature and pressure compensation, having different speeds of registration and employing different methods of fundamental checking.

3. The gas sample may have actually changed in transit between the two competitive instruments.

In any event, there is at present, in this area, no convenient means available whereby anyone can check his own, or his competitor's instrument, and say with assurance that it is or is not correct.

Solution of Problem

This problem would be entirely solved if everyone were provided with, or had access to, a standard gas. It would merely be necessary to run the suspected instruments on this standard gas and, if they did not give the right reading, there could be no argument. This would not only be an expedient for settling controversies, but a means of keeping one's instrument in good condition.

The requirements for such a gas are that it:

1. Be similar to natural gas in gravity and composition.

2. Be of easily determined chemical analysis so that gravity can be calculated accurately.

3. Be cheap and readily available in relatively large quantities.

4. Contain no condensible or changeable constituents.

Description of Proposed Standard Gas

Although these requirements are quite exacting, it seems that we have such a standard gas made to order and readily accessible in the lower San Joaquin Valley. I refer to the so-called Buttonwillow gas, from the Milham lease at Buttonwillow, Calif. This gas is very unusual, in that it is almost pure methane, and its composition has remained practically constant during the past several years that it has been under observation. As proof of the suitability of this gas for standardization purposes, I wish to call to attention a paper entitled "Deviations from Boyle's Law as Affecting the Measurement of High Pressure Gas," recently read before the California Natural Gasoline Association by Walter Dayhuff, of the Standard Oil Company of California, and published in the C. N. G. A. Proceedings of October 5, 1933. This paper describes work done by a committee, several members of which belong to the Southern California Meter Association, on the comparison of various deviation apparata that have been developed the last few years. The method of comparison was to check them all on a standard gas, and the gas chosen was from the Milham lease at Buttonwillow—it being stated in the paper that this gas, after removal of carbon dioxide and water vapor, is "equivalent to nearly pure methane."

The exact analysis of this gas is given as:

Carbon dioxide	0.40%
Methane	99.48
Ethane (+)	0.12
	100.00
Specific Gravity	0.56

A gas of this composition has no condensible constituents unless it be very highly compressed. The amount of water vapor, and hydro-carbons higher than ethane, must be extremely slight, because of the well pressure at which it is obtained. For the practical purpose of checking gravity apparatus to the third decimal place it can be considered as methane and carbon dioxide, and its gravity readily calculated. If a variation, with time, is suspected or discovered an analysis can easily be made with simple equipment.

Practical Aspects of Usage

This gas could no doubt be obtained through arrangement with the lease owners, and shipped in pressure containers, by cooperative arrangements, to any organizations desiring to use it.

A suitable container, similar to the standard oxygen bottle, is described in the November, 1933 issue of *Western Gas* in an article entitled "Bottled Natural Gas for Main and Service Testing" by F. H. Winslow, Southern Counties Gas Co. The well pressure at Buttonwillow being approximately 1,800 lbs., a container would serve for periodic checking of apparatus for several months. Each company could have two containers, one in use and the other being filled, or spare.

Usage for Heating Value Determinations

It might be pointed out that this gas would also be suitable as a standard for calibrating gas calorimeters, and any one who has the care of such instruments would find it invaluable. The proper calibration of a calorimeter involves the adjustment of many in-

dividual pieces of apparatus and after readings are taken, corrections have to be applied that involve the use of a further set of instruments. The search for suspected errors is laborious and uncertain. It would be a considerable relief if one could turn in the standard gas, get the correct B.t.u., and therefore be sure that everything was in proper adjustment.

Conclusion

In conclusion, the writer believes that this proposed adoption of a standard gas is entirely feasible and that its inauguration and usage is a matter of practical detail that can easily be worked out and perpetuated by suitable cooperation among interested parties. It is also believed that such a procedure will be found extremely valuable and a decided advance in the handling of gas.

S.C.M.A. Adopts Standard Gas Sample Method

FOLLOWING presentation of the paper by Mr. Corfield, published above, the proposal for a standard gas sample was referred to the S.C.M.A. Standards Committee. T. K. M. Smith, chairman of this committee, led an extended discussion of the standard gas sample before the Association's May 24th meeting, held at the Lakewood Golf Club, Long Beach. At the conclusion of this discussion, Mr. Smith tendered a motion as a recommendation from the Standards Committee, to the effect that the standard gas sample method be adopted. The motion, seconded by B. G. Williams, read as follows:

"That the Southern California Meter Association go on record as adopting a standard gas sample method for calibrating all types of specific gravity instruments, both of the indicating and recording type; also for the calibration of gas calorimeters; the specific gravity and B.t.u. value of the gas to be agreed upon by a Southern California Meter Association committee, and to be checked periodically, at least once every six months."

All Association members entitled to vote were polled individually by President C. B. Heartwell, following discussion of the motion, and voted unanimously in favor of its passage.

A summary of Mr. Smith's introductory remarks at the May 24 meeting, and of the general discussion participated in by a dozen or more of those present, is submitted below:

Mr. Smith first reviewed general problems encountered in determining specific gravities, leading up to the suggested method for checking the several types of instruments with a gas sample having a known specific gravity.

On May 23 and 24, just prior to the May meeting of the Association, two samples of the proposed standard gas were secured from the Milham Exploration Co., from the Milham lease in the Buttonwillow field in the lower San Joaquin Valley. Specific gravity determinations were made by numerous companies on these samples, the several tests being reported to the meeting by Mr. Smith as follows:

	INSTRUMENT			
Location	Edwards	Acme	Ranarex	Anubis
Los Angeles	.559	.556		
Seal Beach	.560			
Signal Hill	.563			
Huntington Beach	.552			
Compton	.561			
Anaheim	.560			
Los Angeles	.559		.550	
Long Beach	.570		.567	.573
San Pedro	.570			
Santa Fe Springs	.565			
Santa Fe Springs	.557			
Santa Fe Springs	.560			
Santa Fe Springs	.564			

It is believed that uniformity of conditions under which tests were run would eliminate the variations in determinations shown above. Mr. Smith expressed the belief of the Standards Committee that consistent density results can be obtained on any dry gas, through use of extreme caution by the observer and careful manipulation of the balance. To secure dependable results with such apparatus he stressed the need for observing the following procedure:

1. Always be sure that the mercury in the manometer is of high purity.
2. Replace needle points in the balance whenever the slightest sign of wear is suspected.
3. Be sure the glass trough is free from pits and flaws.
4. Never under any circumstances allow the beam to swing so freely that it is permitted to bump the case.
5. Occasionally check the balance, manometer and fittings for leaks.
6. Avoid tapping the balance with fingers or pencil to stop the beam swinging.
7. Use clean, dry air.
8. Guard against vibrations of the slightest degree.
9. Break all connections at the sample tank, never at the balance.
10. Protect the instrument from sudden or extreme changes of temperature.
11. Occasionally re-run the air for the purpose of checking the balance.

Mr. Smith next called upon representatives of a number of companies present for comments on their experience with various types of gravity and deviation instruments, with special reference to the possible usefulness of a standard gas sample.

One speaker reported results of checking five deviation apparata on the standard gas. This gas being over 99 per cent methane, the results were found to check the established deviation of methane closely. It was also reported that samples taken from the Milham Exploration Co. well in 1929 and 1933 showed virtually identical analyses.

Another speaker brought out the fact that there is no method available at the present time for checking a recording colorimeter operating on natural gas of relatively high B.t.u. value. Present methods are roundabout, with many chances for error. The standard gas was held to be ideal for checking such instruments.

Various recording gravitometers were discussed in connection with the standard gas sample. With one type of instrument a gas balance is part of the original cost; it was brought out that this instrument could be set direct by use of a standard gas, thus eliminating cost of the gas balance.

Another type of instrument requires a weight to balance the recording instrument for a check on the accuracy or zero setting. This type of recorder could use the standard gas sample as a further check on the setting.

Other speakers pointed out that the standard gas sample could be used to check operation as well as accuracy of such gravity balances as the Edwards and Acme. The matter of standardizing procedure for use of such balances was discussed at length. For the Edwards Balance the Bureau of Standards has a procedure, the Natural Gasoline Association also has a procedure, and the California Natural Gasoline Association is working on a procedure. It was regarded as highly important that a standard method be developed and accepted for operation of the gravity balance, and that the standard gas sample method be used to check operation under this procedure.

1500 House Heating Installations for St. Louis Gas Co.

Since introduction of natural gas in the St. Louis County Gas Co.'s territory in 1932, the company has made 1500 house heating installations. The company headquarters at Webster Groves, Mo., serving 43,409 meters in St. Louis County, population of which is 211,000.

Twice the number of house heating installations were made during January, 1934, as were made the corresponding month of the preceding year, while February, 1934, installations were three times as many as for February, 1933.

1934 Calendar

June

Canadian Gas Association—27th Annual Convention, Windsor Hotel, Montreal, Canada, June 4-5.

Michigan Gas Association—Annual Convention, Grand Rapids, Mich., June 19-20.

Hydraulics and Aeronautics Division, A.S.M.E.—University of California, Berkeley, Calif., June 19-20; and Stanford University, Palo Alto, Calif., June 21.

Northwest Regional Conference, Pacific Coast Gas Association—Portland, Ore., June 21-22.

September

Second International Gas Conference, International Gas Union—Zurick, Switzerland, September 1-4.

Pacific Coast Gas Association—41st Annual Convention, Hotel Del Monte, Del Monte, Calif., September 11-13.

October

American Gas Association—16th Annual Convention, Atlantic City, N. J., Week of October 29.

BUTANE • PROPANE NEWS

Vol. 4, No. 6 June, 1934

California Safety Orders Reviewed

By F. A. PAGE

Supervising Engineer, Boiler Section
California Industrial Accident Commission

ABOUT eight months ago the commercial use of butane gas took a sudden upward turn, in California, as fuel for tractors, trucks, buses and a limited number of automobiles. This involved the storage and transportation of this gas in liquid form.

Butane, as sold to the trade, consists usually of a mixture of butane, iso-butane and propane in various proportions. This product at normal temperatures and pressures is a gas, but can be liquefied by pressure and as such is conveniently handled and stored.

There are hazards in handling such highly inflammable gases under pressure. In many cases a lack of appreciation of the hazards created by improper facilities and manipulation has resulted in false ideas as to the safety of this fuel, and many unsafe methods have been and, in some cases, are still being practiced. Some of these are: The use of vessels of shapes and designs too weak to stand the pressures that may be built up during warm weather; insufficient relief capacity—use of fittings and valves intended for normal water pressures only. The use of ordinary rubber hose for the transfer of this liquid and failure to provide proper electrical grounding are sure to cause serious trouble.

To combat the hazards and to stop unsafe practices, the Industrial Accident Commission's engineers, together with the engineers of the parties interested in the manufacture of liquefied petroleum gas, those concerned in the fabrication of tanks and the manufacture of equipment, assisted by representatives of the Fire Departments and users of butane, formulated a tentative proposed set of safety orders covering the handling, storage, transportation and utilization of these gases.

These tentative proposed orders were then presented at public hearings held both in San Francisco and Los Angeles. At these hearings several minor changes and corrections were asked for. After these changes and corrections had been made, they were presented to the Industrial Accident Commission by whom they were adopted and made effective as of March 12, 1934.

Following are excerpts from these Orders:

ORDER 2008. Construction of Tanks

All tanks shall be of circular cross section and shall be constructed in accordance with either the requirements of the proposed Unfired Pressure Vessel and Air Tank Safety Orders or those of the A.S.M.E. Unfired Pressure Vessel Code.

In order to meet the requirements of the proposed orders, the following conditions must be complied with:

1. All welders must qualify as Class 1 or 2 welder before being permitted to work on such tanks.
2. All material and work must be fully shop inspected during construction by an inspector certified by the Industrial Accident Commission.
3. All material used, if ¼-inch or over in thickness, must be of firebox or flange quality. In thickness less than ¼-inch, A.S.T.M. specifications A-7 steel may be used. Other materials may only be used on written approval from the Industrial Accident Commission.
4. All welded seams or joints, not double vee or back welded, shall be welded on a backing-up strip, permanent or otherwise.
5. All openings shall be fully reinforced and all flanges, nipples and couplings shall be welded both inside and out, with a sufficient number of beads to insure proper strength contact.
6. All work must be done in a good workmanlike manner.
7. When all the above items have been fully complied with the following stresses will be allowed in the longitudinal welded joints per square inch of cross section:

11,000 pounds for butt double vee in thicknesses ¼-inch and over;
8,937 pounds for butt single vee in thickness less than ¼-inch.

In no case shall the thickness of steel used be less than 0.100 inch.

The maximum permissible stress of all longitudinal welded joints, where all items except No. 2 have been complied with, shall be 8000 pounds per square inch of cross section for butt double vee in thickness of ¼-inch and over, and 5600 pounds per square inch of cross section for butt single vee and in thickness less than ¼-inch.

ORDER 2004

A certificate of inspection to use any installation or tank is required from the Industrial Accident Commission.

ORDER 2009. Working Pressures on All Tanks

Tanks to be buried shall be built for the vapor pressure of the gas to be used at 90 degrees F. plus a corrosion allowance of 1/16-inch or ⅛-inch, see Order 2014, maximum capacity 15,000 gallons.

Above-ground storage tanks shaded or insulated ..... 110°F.
Unshaded or uninsulated ..... 130°F.

Minimum pressure for which any tank shall be designed is as follows:

1. Buried tanks, 75 pounds per square inch.
2. Above ground storage, 90 pounds per square inch.
3. Truck, transportation, swing and skid tanks, 125 pounds per square inch.
4. Fuel tanks, 175 pounds per square inch.

In cases where the vapor pressure of the gases used, corresponding to a temperature of 130° F., *if completely shaded from the sun,* and 140° F., *if not shaded from the sun,* will be in excess of 175 pounds per inch, the greater pressure shall control.

ORDER 2010

Each tank shall have permanently attached a brass or other non-ferrous metal plate upon which the following shall appear in letters not less than 3/16-inch high:

1. Name of manufacturer.
2. Year built.
3. Thickness of heads and shell.
4. Manufacturers' Serial No.
5. Maximum working pressure.
6. A blank space at least ⅞-inch x 3-inch for State Serial No.
7. The words "This Tank for *Butane* Only."

If this plate is not readily visible from the ground, a duplicate plate shall be placed near the filling opening.

Protective coating required on tanks to be buried. See Order 2014.

ORDER 2028, Section (c)

Every tank shall have emergency discharge openings of such size as to accommodate safety valves, fuse plugs or breaking disc, equal to an area of not less than that computed in Order 2028, using the following formula:

$$a = \frac{0.77 \times A}{p}$$

a = area of discharge openings.

p = pressure per square inch + 15 pounds.

A = total outside area of tank in square feet

0.77 = a constant.

Minimum size of safety valves that may be used is ¼-inch pipe size on tanks having a water capacity of 300 gallons or less, and 1-inch pipe size having a capacity in excess of 300 gallons.

Piping for stationary tanks, See Order 2022.

ORDER 2024. Valves and Connections

All valves or cocks shall have a rated steam working pressure of at least 250 pounds between the tank and any reducing valve. *"Cast iron valves shall not be used."*

Safety valves, breaking discs and fuse plugs. See Order 2028.

Transfer connections, location of. See Order 2027.

Pressure gauges required. See Order 2029.

Location of storage tanks. See Order 2012.

Installation of Storage Tanks. See Order 2014.

Fuel Tank—Road Clearance and Fastenings. See Orders 2015 and 2018.

Dikes and Embankments. See Order 2016.

Protection of tanks from injury. See Order 2017.

Permanent Stations for truck trailer and skid tanks. See Order No. 2019.

Clearance around tanks. See Order 2020.

Warning signs. See Order 2021.

Every tank shall be equipped with a dip pipe of small size. See Order 2030.

Filling ratio. See Order 2031.

Transfer of liquid. See Order 2032.

ORDER 2033. Control of Filling Tanks

"No employer shall cause or permit to be filled, and no employee shall fill any tank with liquefied petroleum gases 30 days after the effective date of these orders, unless there is in force a certificate of inspection as required by Order 2004, or unless an inspection has been requested and the request remains unacted upon."

ORDER 2034

No employer shall permit, and no employee shall put into any tank a product which will have a vapor pressure in excess of the allowable working pressure of the tank at the design temperature specified in Order 2009, except that from October to May, inclusive, the vapor pressure may equal the allowable working pressure of the tank at a temperature 20° F. lower than the design pressure.

ORDER 2035

The vendor shall maintain with the Commissioner a record giving the maximum vapor pressure of his product at the design temperature given in Order 2009, and the minimum specific gravity at 60° F. This record shall be kept up to date with current or seasonal changes in specification.

Appendix A covers method for determining vapor pressures.

Appendix B covers good practices for the storing, transferring and burning of this fuel.

Copies of the Liquefied Petroleum Gases Safety Orders may be purchased from the Industrial Accident Commission, Room 157 State Building, San Francisco, Calif., and Room 601 State Building, Los Angeles, Calif., at the following prices:

Single copies by mail $.15; (called for $.10).

In lots of 5 by mail $.60; (called for $.50).

In lots of 10 by mail $.95; (called for $.80).

Each copy more than 10 by mail $.07; called for $.06).

Philgas Industrial Sales Up

The industrial gas division of the Philgas Co., Detroit, Mich., in 1933 experienced the biggest year in its history, increasing the total butane and propane sold for industrial purposes by 71½ per cent over 1932.

Due to design—due to workmanship—due to proper raw materials—Hackney Liquefied Petroleum Gas Cylinders stand two to one favorites.

Two to one—*all others combined.*

Hackney serves the leaders: Shell, Standard, Phillips, Hope, Skelly, etc.

Hackney cylinders for Butane, Propane, and Butane-Propane mixtures have been in the field from the first.

For other gases, Hackney cylinders serve: Frigidaire, Pennsylvania Salt, Mathieson, Virginia Smelting, and many others.

Hackney cylinders may be accurately called "supreme".

Hackney
MILWAUKEE

Pressed Steel Tank Company

208 S. LaSalle St. Bldg. Room 1185 CHICAGO, ILL.

1363 Vanderbilt Concourse Bldg. NEW YORK, N. Y.

6633 Greenfield Ave. MILWAUKEE, WIS.

666 Roosevelt Bldg. LOS ANGELES, CALIF.

CONTAINERS FOR GASES. LIQUIDS AND SOLIDS

KEROTEST
tested and proved
FORGED BRASS
VALVES,
MANIFOLDS
and FITTINGS
for
PROPANE
BOTTLED GAS
SERVICE

Write for descriptive circular

KEROTEST MFG. CO.
PITTSBURGH, PA.

KEROTEST

N. F. P. A. Committee on Gases Submits Report

From May 14 to 17 the National Fire Protection Association held its annual meeting, in Atlantic City, with an attendance of from between 400 and 500. Of particular interest to the gas industry was the adoption of the 1934 report of the N. F. P. A. Committee on Gases. This report brought final adoption of the regulations on installation and use of internal combustion engines, superseding those of 1922. Another section of the report, adopted tentatively, covered regulations for the design, construction and operation of automobile tank trucks and tank trailers for the transportation of liquefied petroleum gases. Some revisions affecting storage and handling of liquefied petroleum gases were also adopted.

Blaugas Co., Pioneer in Liquefied Gas Service, in New Hands

The Blaugas Co., pioneer in the liquefied gas field, has been purchased by the Deutsche Erdel-Raffinerie A.-G. (Deurag) at Hanover, Germany. Another German company manufacturing propane is the I.G.-Farben A.-G., Frankfurt am Main, with plants at Leuna near Merseburg.

C.G.M.A. In Summer Meeting

The Compressed Gas Manufacturers' Association, Inc., headquartering at New York, N. Y., will hold its summer meeting June 14-16, at the Seaview Golf Club, Absecon, N. J.

BUTANE
Fuel of the Future

BUTANE is an efficient, economical substitute for manufactured gas, natural gas, and electricity for domestic and industrial uses, including heat-treating, cutting, welding, refrigerating. The perfect fuel for rail motor cars, busses, trucks, stationary engines.

Investigate By Requesting Engineering Data and Complete Details

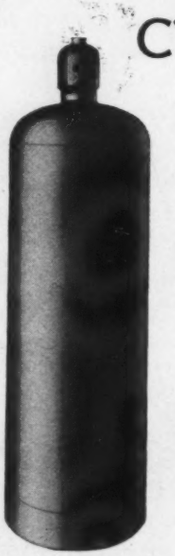
BUTANE
SALES
CO.

Pioneers in Butane Development

55 New Montgomery
San Francisco
SUtter 5678

973 North Main
Los Angeles
CApital 12108

SCAIFE
CYLINDERS



FOR LIQUEFIED PETROLEUM GASES

•

MANUFACTURED IN ACCORDANCE TO I. C. C. SPECIFICATIONS

•

CAPACITIES TO MEET CUSTOMERS REQUIREMENTS

•

Founded 1802

• • •

WM. B. SCAIFE & SONS CO.
OAKMONT, PENNA.
NEW YORK PITTSBURGH CHICAGO

Mexico City to Have Liquefied Petroleum Gas Service

The Mexican Petroleum Co., Mexico City, Mexico, is preparing to distribute liquefied petroleum gas by cylinders in Mexico City for domestic use. A tank car will bring the gas from the company's plant at Tampico to a large storage tank which will be constructed in the city. Capacity of the cylinders is given at 45 kilos. A deposit on the cylinders will be required from customers, who will be charged about 6½ U. S. cents per pound for the gas service.

Butane-Propane Service Station for San Diego Waterfront

Chas. W. Wright, San Diego, Calif., announces the erection of a service station on the waterfront of San Diego, to serve boats and trucks a General Petroleum Co. product consisting of 80 per cent butane and 20 per cent propane. The service station will open in June under the name of Wright and Mueller, and will be of 10,000-gallon storage capacity. Other stations are expected to be installed later by the company.

Philgas Co. Inaugurates New Sales Campaign and Contest

The Philgas Co., Detroit, Mich., has under way a new sales campaign and contest, the theme of which is a balloon race to the stratosphere. In addition to prizes offered to salesmen during the campaign, prizes will be given to Philgas customers for prospects which they turn in and which are sold before June 15, 1934, the expiration date of the campaign. The Philgas range rental plan continues in force during the campaign.

Compressed Gas Mfgrs' Ass'n. Issues 1933 Annual Report

Compressed Gas Manufacturers' Association, New York, N. Y., has issued its Twenty-first Annual Report covering the year 1933, and including the Proceedings of the Twenty-first Annual Meeting held January 25-26, 1933, in New York City. F. R. Fetherston is secretary-treasurer of the Association.

Bottled Gas Held Not Subject to Commission Jurisdiction

On April 20 the Public Service Commission of Maryland dismissed a complaint which sought to place bottled gas operations of the Philgas Co. under the Commission's jurisdiction. Dismissal of this case in favor of the Philgas Co., adds to the precedent already set in the Paramount Utilities Co. case before the Ohio Supreme Court a year or more ago.

George Frederickson Vice-President Oklahoma Natural Gas Company

George Frederickson, director of the Oklahoma Natural Gas Co., Oklahoma City, Okla., has been elected vice-president in charge of public relations for the company's Western Division, with headquarters in Oklahoma City.

REGULATORS YOU CAN RELY ON — RELIANCE — SINCE 1918 — TRADE MARK

RELIANCE offers 5 Bulletins

treating in full detail, various types of REGULATORS for gas pressure control in domestic and industrial installations

In the above bulletins are included these types

TYPES "MR", "MC", "B" and "BK"—liquid petroleum gas regulators permitting automatic control of bottled gas fuels.

TYPE "Y"—low pressure appliance regulator for all household installations of water heaters, gas refrigerators and other appliances.

TYPE "A"—spring or weight loaded appliance or house regulator for positive control on low pressure distribution systems where peak loads require "boost" pressures.

TYPE "K"—light weight, rugged, compact, general service regulator.

TYPE "P"—newly developed industrial or district regulator with radical departures from conventional type regulators. Available in lever weighted or pilot control types.

Complete with authoritative engineering data, these five Reliance Bulletins will be invaluable to you as reference handbooks. They treat in specific detail with every gas pressure control regulator manufactured by Reliance; each type is accompanied by illustrative material and detailed specifications.

Whatever the installation or kind of gas—whether it's domestic or industrial—butane, manufactured or natural gas, in one of these bulletins is the story of the regulator that will meet the particular requirements.

These bulletins are offered absolutely free and without obligation on your part. Write for your copies today, direct to the address given below.

RELIANCE REGULATOR CORP., ALHAMBRA, CALIF.

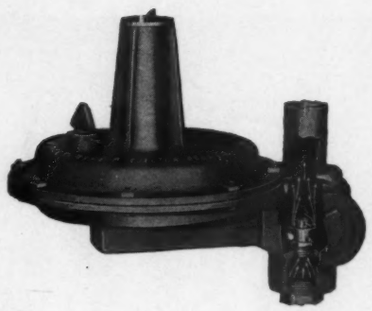
RELIANCE REGULATORS

New Emco Ejector Type Regulator Improvements Announced

THREE improvements in service regulator design are embodied in the Emco ejector type regulator, recently developed by the Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

According to the manufacturers, the ejector principle of flow stream control provides increased capacity and automatic loading. The gas flow as it leaves the orifice formed by the valve and valve seat, is guided in such a way that it enters the pipe line system with a minimum amount of pressure loss. The streamlined shape of the flow acts somewhat as a venturi, causing a decreased pressure as volume increases at a point just ahead of the entrance into the pipe system. This pressure is the pressure which exists under the diaphragm, and the regulator will act to maintain this low pressure point of the stream at the value for which the spring is set. Since this point becomes relatively lower than the pressure in the pipe line as the velocity increases, the effect is to raise the outlet pressure in the pipe line by the amount of the venturi effect.

By improving the diaphragm spring design, Emco engineers have decreased pressure variations to a marked degree, while the new Emcomold valve, found on this regulator for the first time, provides low shut off.

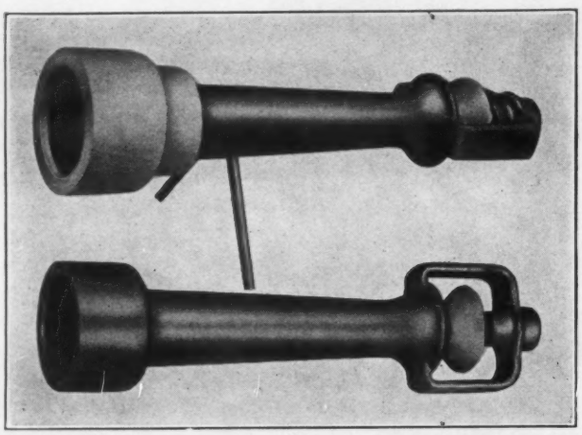


A feature of the Emco ejector regulator is that any existing Emco type B service regulator can be converted into the new type by the addition of a few small parts. Further information may be secured by writing the manufacturers.

N.G.E. *new* Types 14-15-16 Burners

embodying the Venturi Principle

offer extremely wide application and use



Illustrated is Type 16 — with and without refractory tile flame retention tip.

These N.G.E. burners are ideal for an extremely wide variety of installations; for kilns, dippers, small boilers, direct-fired bake ovens, stills, furnaces, incinerators, etc. At the same time they meet an ever increasing demand for a *moderately priced* Venturi type burner that will give satisfactory service at a minimum cost. Types 14, 15, 16 Burners are identical in design and construction, but are available in different sizes for varying capacities.

N.G.E. Venturi burners are modifications of the Venturi meter tube and operate on the principle of entraining the major part of the air required for combustion by the pressure energy of the gas issuing from an orifice into the Venturi throat of the burner. These modifications permit efficient utilization of the Venturi principle with excellent flame retention qualities and very low turndown characteristics. Efficient operation is obtained over a gas pressure range of from four ounces to five pounds.

New literature is available on these flexible burners. Write today for your copy.

N. G. E. Gas Burners, N. G. E. Liquid Level Controllers, N. G. E. Wilgus Gas Fuel and Pressure Regulators, Webster Radiant Gas Burners, Surface Combustion Industrial Furnaces, Janitrol House Heat Machines.

NATURAL GAS EQUIPMENT INC.

Petroleum Securities Bldg., Los Angeles | **1123 Harrison Street, San Francisco** | ***Arizona Distributors:* Crane Co.**

LOOK TO THE PIONEERS FOR CONTINUED LEADERSHIP

Texas Cities Gas Co. Constructing Own Office Building at Waco

Construction has begun on the Texas Cities Gas Co.'s new $50,000 office building at Ninth and Washington Streets, Waco, Texas. C. V. Allin, is manager for the company at Waco. The building will be a single story structure 90 by 160 feet, of hollow tile and reinforced concrete. It will be of Spanish style architecture with red tile roof, the front to be finished in light stone and marble. A company garage will be located in the basement. Provision for ample appliance display space has been made.

Estate Stove Co. Issues New Institutional Campaign

The Estate Stove Co., Hamilton, Ohio, is making available to commercial departments of utility companies mats and electros of a series of small space, institutional advertisements on the company's line of gas ranges. Each of the advertisements links up the modern gas range with some other aid to modern living—such as the new streamlined autos, the latest in radios, women's styles, etc. The campaign already has brought good results in several localities.

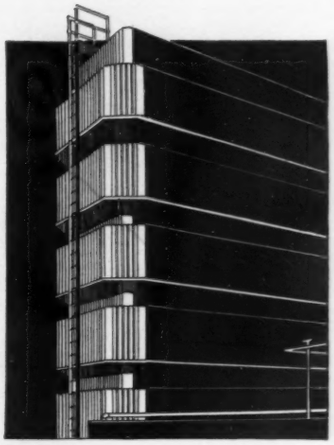
P. W. A. Funds Asked For Oklahoma Projects

Applications for $200,000 and $70,000 to be used in the construction of municipal natural gas distribution systems for the towns of Erick and Tahlequah, Okla., respectively, have been made to the Public Works Administration. The Globe Gas Co., McAlester, Okla., has also requested a $212,000 loan to construct a gas transmission line to serve a group of towns in Pittsburg County which do not now have gas service.

Ardmore To Vote On O. N. G. Franchise

Ardmore citizens will vote June 5 on a proposed 25-year franchise to the Oklahoma Natural Gas Co. The former franchise held by this company in Ardmore expired nearly five years ago.

be sure with FLUOR!



In the construction of cooling towers or compression plants, gambling should play no part. Turn to an engineering organization with proven experience and foresight. Turn to a company who has built more efficient, economical units over a longer period of time than any other. Gas Industry executives and engineers have not specified Fluor construction for the past 40 years because they like the name. They have insisted on Fluor because they realize that specialization in any engineering field produces improved designs, materials and operating efficiencies.

Check the vertical plane construction of Fluor cooling towers. Investigate the Fluor air cooled design mufflers for compressor plants. Follow the scores of progressive developments of Fluor engineers. Do this and there'll be no gambling on your next job.

. . . IT WILL BE FLUOR

. . . Somis plant of Ventura Fuel Company - - - built by The Fluor Corporation, Ltd.

FLUOR CORPORATION
• LTD •
909 East 59th Street • LOS ANGELES, CALIF

TABLE NO. 2. CUBIC FEET OF GAS PER GALLON OF HOT WATER

DIRECT SYSTEM		CIRCULATING SYSTEMS			
		SINGLE-LOOP (End riser connected to return pipe)		MULTIPLE-LOOP (All risers connected to return main)	
Bare Pipe	Insulated Pipe				
Bare Pipe	Part Insul'd Pipe	Bare Pipe	Part Insul'd Pipe	Bare Pipe	Part Insul'd Pipe
1.08		1.93 (1)	2.60 (2)	2.00 (1)	1.70
1.12				1.95	1.65
1.10				2.00	1.95 (3)
					1.58 (3)
					1.80
					1.91
1.10*		1.93*	2.60*	1.98*	1.76*

*Average
(1) Same apartment house, altered as mentioned previously.
(2) Very low water consumption.
(3) Same apartment house, low value for forced circulation.

TABLE NO. 3

Alterations, or Work Done	Results
Found O. K.	None
Replaced large minimum flame with standard pilots	Saved 6.9% plus maintenance expense on thermostat
Placed all heaters on gang thermostat	Saved 8.3% plus possible maintenance expense on thermostat
Removed laterals from drop risers to return main	Saved 10.5%; supplied hot water on the first floor
Installed draft hood	Saved 13.5% (Combustion tests, only; meters removed before draft hood installed)
Cleaned heater coils	Saved 9.5%
Cleaned heater tanks, cut water temperature	Saved 15.9%
Cut gas, adjusted heaters; new flue	Saved 14.0%
Changed thermostat location, cut temperature	Saved 18.5%
Found O. K.	None
Installed circulating pump, put one heater on gang thermostat, removed low pressure regulator	Saved 27.3%
Cut gas, changed thermostat, cleaned coils, installed draft hood	Saved 10.0%

Better Apartment House Water Heating Service

(Continued from Page 13)

when two thermostats are at different elevations in the system, and when large minimum flame pilots are used. In each of these situations the result is the same: one part of the fuel is stopped when the water reaches the control temperature, and the remainder continues to burn. If water usage is light, the water may be over-heated and the thermostat overstrained and rendered ineffective.

Hot water piping was found installed in two general styles; direct, or without circulation, and circulating. Insulation was very sparingly used. Every storage tank was insulated. Many of the lines connecting heaters to storage tanks were insulated. No hot water risers, or return lines, were insulated, except occasionally in the boiler room, only. About half of the horizontal hot water supply mains were insulated, although in some installations only the main and not the branches to the drop risers were insulated. Despite these conditions and some rather haphazard piping methods, only two complaints were directly attributable to faulty circulating systems. One service complaint resulted from the fact that the circulating lines were bare, and all open to excessive cold drafts. The system was the multiple-loop type, or one where each drop-riser connected to the return main. The hot water and return mains were both incorrectly graded and sagging. The return main did not have sufficient capacity to remove the water cooled in all the drop-risers. The result was that it was impossible to get hot water on the first floor. This condition was remedied by disconnecting all drop-risers (except that at the end of the system) from the return main. This kept the hot water in the supply main, and made it possible for the first floor tenants to get hot water. In another case, the return mains were adequate, but it was necessary to use excessive initial temperatures to get hot water on the first floor. This was overcome by installing a circulating pump, which made it possible to reduce the initial temperature nearly 20 degrees.

The unit and total consumption of hot water and gas used for heating were found to be closely related to each other and to the general characteristics of the system.

It was found that hot water consumption was closely related to water temperatures. Water consumption increases at such a rate that there is a limit to the savings possible in any given installation through reducing water temperatures. While faucet temperatures as low as 120 degrees F. were found satisfactory, higher temperatures are more desirable. The higher temperatures give some flexibility and some safety factor for changes in air and supply water temperatures. The habits of individuals have some influence, although the daily water consumption did not vary so much as might be expected from the widely different types of apartments studied. Table No. 1 indicates the variation, and may be useful in checking the wastage of water through leaks and improper usage.

The gas consumption per gallon of hot water used was found to vary with the water temperature, the quantity of water used, the condition of the heaters, etc., for any particular installation. Since heat losses increase and water usage decreases with an increase in water temperature, the temperature which provides the maximum service at the least cost must be determined by experiment. This temperature will depend on the characteristics of the system as to capacity of heaters, style of piping, etc. Poor adjustment of heaters, excessive scale, and such conditions should be corrected, as a matter of course. A general variation in cost is noticed between different installations, depending on the style of piping and the amount of insulation. This difference is shown in Table No. 2. It is believed that the single-loop circulating system would show more efficiency than the multiple-loop system, if enough installations had been studied. Both examples presented are exceptional in some characteristics.

The general run of conditions encountered and the results of attempts to reduce gas consumption is indicated in Table No. 3.

The total consumption of gas used for water heating was found to vary between 26 and 89 per cent of the total gas used in the apartment houses studied, and averaged 69.6 per cent. The low percentage was obtained in a gas-heated apartment house for a winter month. The high percentage occurred during the summer months. The other averages include all types of apartment houses, and practically every month of the year.

The mere existence of conditions outlined above indicates a need for a better understanding of the design and economics of water heating systems on the part of many apartment house owners.

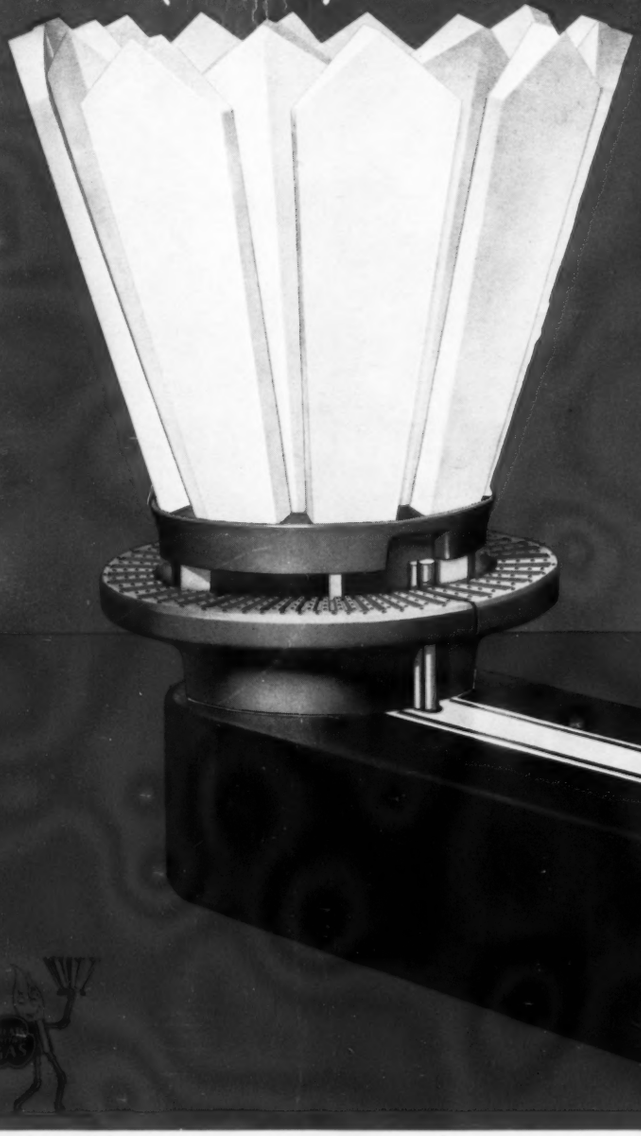
Douglas Annin Joins Minneapolis Honeywell Regulator Co. Staff

C. B. Sweatt, vice-president in charge of sales for the Minneapolis-Honeywell Regulator Co., of Minneapolis, Minn., announces the appointment of Douglas Annin to the sales and engineering staff of the company's industrial regulator division, which is in charge of Ralph L. Goetzenberger.

Mr. Annin at one time was chief engineer of Neilan Co., Ltd., Los Angeles, Calif. When the company merged with the Mason Regulator Co., he became sales engineer for the combined Mason-Neilan Regulator Co. of Boston. He is a graduate of the California Institute of Technology.

Introducing

The NEW JANITROL



FOR THE FIRST TIME

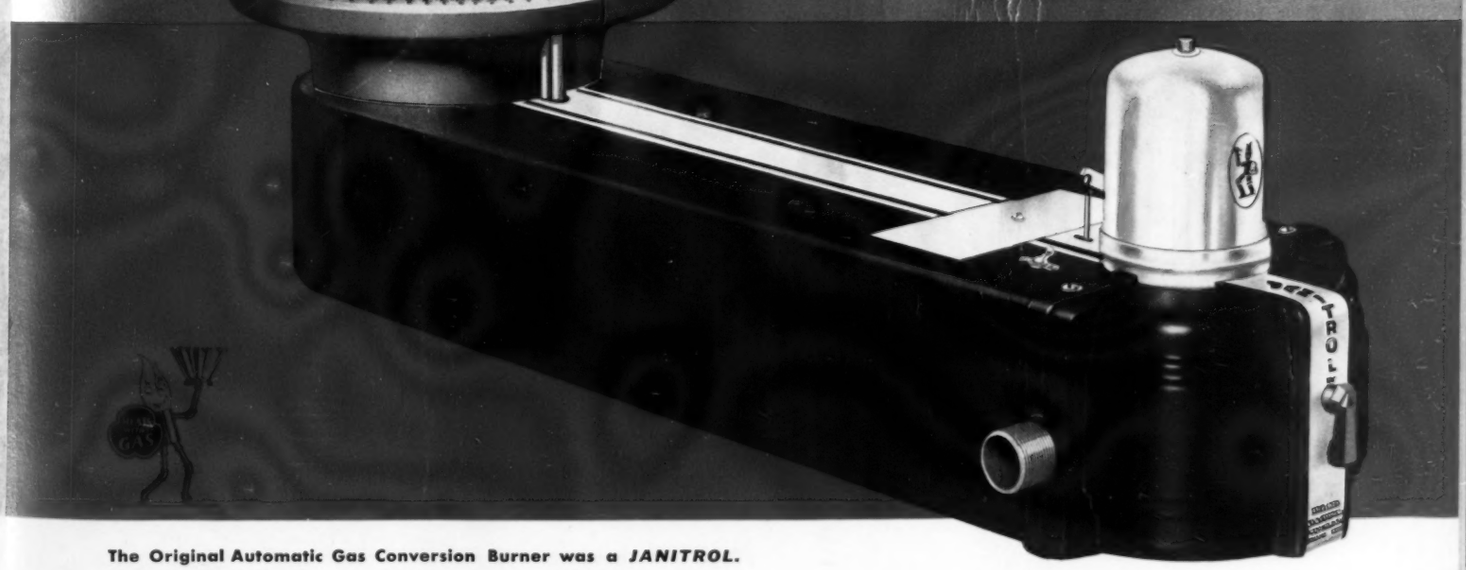
...eye appeal has been built into a conversion burner! This feature, combined with many other refinements on the already popular JANITROL, assures the Gas Industry of a burner that will meet with as much popular acceptance as is accorded any other modern appliance.

The merit of all the features of the old JANITROL has been established by more than 50,000 installations. These features have been retained in the new JANITROL ... improved where possible.

New features have been added! New refinements, advanced design and simplified construction, make this new appliance one which you will be proud to sell. *A popular number!*

And naturally we are proud to introduce the new JANITROL with its new appeal, new character, new beauty!

Be sure to see the next page.



The Original Automatic Gas Conversion Burner was a *JANITROL*.
Now, JANITROL brings style and beauty to this important appliance.

Announcing . . . .

The New JANITROL has been designed primarily to give the Gas Industry a conversion burner that will be more easily merchandised. To assist in new merchandising activities we are offering a strongly built, beautifully designed, chromium plated display table with each display JANITROL. Write for illustration and further information on this offer.

NEW

Broadside, 4 page letter, envelope stuffers, newspaper mats, window display material, and display tables available to assist you in advertising and merchandising the new JANITROL

SALIENT FEATURES

APPEARANCE. Smart and attractive (with complicated aspect eliminated), the simplified exterior is finished in rich blue and trimmed with silver. It is as beautiful and pleasing to the prospect's eye as ANY modern appliance.

ENCLOSED MECHANISM. Since all mechanism is enclosed, adjustments are all protected from tampering and from dust and dirt. This feature means greater satisfaction to the customer and fewer calls to the utility.

ACCESSIBILITY. Access to all controls, which are located in the front end of the unit, is made simple and convenient. In fact, all controls—the pilot, regulator, manifold and orifices are replaceable in 10 minutes.

ONE POINT CONTROL is another feature destined to become popular with the utilities as well as with the customer. One point control is achieved in the following manner. A single lock on the front end of the unit simultaneously controls pilot and an electric pilot lighter which operates in conjunction with the electric valve circuit. This feature makes it extremely simple for the customer to light or extinguish the pilot at his own convenience, thereby saving many calls to the utility.

PILOT. The Surface Combustion automatic pilot for many years has demonstrated its excellent performance and dependability. Now, however, speed has been added! While the old pilot required minutes to function, the new pilot functions in a few SECONDS! Ruggedly built and positive in action, the new pilot is a good pilot MADE BETTER. It now embodies an interconnected two-way flame, one part for lighting the burner—the other for heating the expansion element which controls the pilot action. The entire pilot assembly is easily removable without disturbing any other part of the unit. Because of the ease of customer control the pilot gas consumption can be eliminated during mild weather.

COMBUSTION. Full primary and secondary air control is a very important feature contributing to the high efficiency of the new JANITROL. Proper air control and equal air distribution to the burner heads is an achievement of vast importance, highly necessary to complete and accelerate combustion. The hot gases are properly guided by patented overlapping baffles leaning against the side walls of the furnace.

OPERATION. New and more efficient operation will doubtless interest you as well as the customer. In addition to some of the features already mentioned, refinements in construction and improved design throughout, particularly in the manifolding and the burner heads, also contribute much to highly efficient and satisfactory performance of the new JANITROL.

You will want to know more about this interesting new unit. We are proud of it.

THE MEANING OF EYE APPEAL

It has long been known that one of the strongest of all sales appeals is beauty. Now beauty comes to the conversion burner, not so much for its value to the consumer as to you. A product can contain no more valuable merchandising asset than beauty. It helps to create desire, to establish preference, to gain decision.

Whether on the display floor, the show window, or in advertising, the eye appeal of the new JANITROL is a constant asset.

Surface Combustion

TOLEDO, OHIO SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Remodeling Memphis Plant for Standby

(Continued from Page 11)

and 70 gallons per minute in carburettor are used with 50-75 pounds down-steam and 175-200 pounds up-steam per minute. Generator blast damper is set to give 4500 to 5000 cubic feet of air per minute. Oil is gradually increased until at the end of 10 cycles, 40 gallons in generator per minute and 80 gallons in carburettor, is being used. In the generator we use a mixture of about 60 per cent 19° Bé fuel oil with 40 per cent 32-40° Bé gas oil. Straight gas oil is used in the carburettor. A variety of fuel oils might be used in generator but for well balanced operation a minimum of 3 per cent Conradson carbon is deemed necessary. An oil of considerably higher carbon content may be used.

Typical Operating Cycle

A four-minute cycle has been found to be of about the right length. The following tabulation shows the sequence and relative duration of the various gas making operations, on a hot valve set:

Minutes	Seconds	
0	0	Open stack valve Open carburettor blast Open up generator blast (15 seconds lag)
0	15	Open carburetor burner oil
1	15	Open generator down-blast Close top hot valve Close up generator blast
2	10	Close stack
2	15	Close down generator blast
	20	Close carburettor blast Open steam Open carburettor make oil Open generator make oil
3	10	Close generator make oil Open top hot valve
3	35	Close carburettor make oil Close carburettor burner oil
	55	Close main steam valve
4	00	Repeat cycle

Results Obtained

The following are the results of a four-hour run on one of our sets after a heating-up period of about four hours:

Average oil required to heat up from cold:

Generator oil	636 gallons
Carburettor oil	312 gallons
Total heating oil	948 gallons

Operating run duration four hours, 60 cycles.

Gas produced per hour 200, M c.f.

Analysis of Gas

CO_2	1.7%
Ill.	22.5
O_2	.4
H_2	27.6
CO	2.7
CH_4	35.9
C_2H_6	.4
N_2	8.8
	100.0
B.t.u. by Calorimeter	930
Specific Gravity	.64

Interchangeability With Natural Gas

Gas produced during this run was supplied to a part of the city estimated to include about 3000 customers. From this section the following complaints were received:

		Per Cent
Readjust Ranges	108	32.4
Readjust Space Heaters	40	12.0
Readjust Automatic Water Heaters	20	6.0
Readjust Conversion Burners	4	1.2
Leaks	162	48.4
Total	334	100.0

It will be noted that nearly half the complaints were leaks, despite the fact that the natural gas distributed is odorized. This suggests that the oil gas has a stronger odor than natural gas with the concentration of odorant ordinarily used.

In addition to the practical results indicated above, a number of typical appliances were tested at the plant to observe their behaviour with oil gas. It was observed that with the same operating pressures as used with natural gas most appliances operated normally, though yellow flame reflector-type heaters had a tendency to smoke unless the pressure was reduced.

Conclusions

The process, so far as can be judged from the short duration of the performance tests made in our plant, seems to meet in a high degree the desired qualifications. There are no solid fuels to handle and no fires to clean. One man can operate a set. Although our operators had had little operating experience during the past five years that our plant has been shut down, they picked up the new operating procedure very quickly. The process requires a level head and good judgment on the part of the operator, but no more so, in our estimation, than should be expected from operators of the usual water gas process.

The process gives us, we estimate, approximately 85 per cent more B.t.u. output per day than we could reasonably obtain from the carburetted water gas process, and the gas would operate much more satisfactorily in customer appliances.

Production Oil Used		Gallons per Cycle	Per M c.f. Gas Made
Generator Oil	2827 gal.	47.2	3.54
Carburettor Oil	5020 gal.	83.7	6.28
Carb. Heat Cycle Oil	700 gal.	11.7	.88
Total oil during Operating period	8547 gal.		10.70

TEMPERATURE CONDITIONS — ° F.

	Bottom Gen.	Middle Gen.	Top Gen.	Carb.	Super-Heater
Beginning of Operating Period	2040	1510	1760	1580	1360
End of Operating Period	2150	1620	.....	1440	1460

Mobile Displays

(Continued from Page 12)

ducted outside under cool shade trees.

State and private colleges conducting special summer courses for farm wives may use the truck in demonstrating home economics. One company man accompanies the truck to assist. It was used last season at a North Texas school where 1,500 farm women gathered for a special course. While no advertising or selling was done many women voluntarily announced themselves as prospects.

As many at 1,200 pieces of advertising have been handed out to interested spectators in one day during large gatherings.

Stargas and local gas company representatives usually work together in a demonstration. All city prospects obtained by the Stargas representative are turned over to the local office.

Local clubwomen are invited to use the truck as a kitchen when fund-raising dinners are served at fairs or other outdoor gatherings. In one town the Electrolux was used to store food for a fair booth operated by a local woman's club.

Lowe Appointed Secretary-Treasurer Natural Gasoline Association

The Natural Gasoline Association of America has announced the election of William F. Lowe as secretary-treasurer, succeeding Ray E. Miller recently resigned.

Mr. Lowe is a graduate of the University of Michigan where he majored in geology and engineering. Following his graduation he entered the organization of the Midwest Refining Co. at Salt Creek, Wyo., where he obtained several years of practical experience in oil production. Early in 1927 he was transferred to the geological department of the Midwest Exploration Co. at Amarillo, Texas. In 1929 he accepted a position as staff writer on National Petroleum News with headquarters in Tulsa. The experience of Mr. Lowe with this publication has been varied, serving as engineering editor for International Petroleum Technology, the technical publication of the National Petroleum News. Mr. Lowe was later transferred to the Cleveland office and for the past year has been engaged in marketing problems connected with the Oil Code.

Kentucky Towns To Have Gas Supply From New 126-Mile Line

Kentucky Public Service Co., with state headquarters at Elizabethtown, Ky., has begun construction of a 126-mile natural gas pipe line from the Sonora gas field, to furnish gas to a distribution system which will be installed at Elizabethtown. According to J. N. Ashcraft, vice-president of the company, laterals will extend from Elizabethtown to Fort Knox through Vine Grove and to Hodgenville, from which point extensions will be made to New Haven. At New Haven branches will extend to Bardstown and to Lebanon, and from Lebanon to Springfield. The Sonora line will be extended to Upton, Bonnieville, Munfordville and Horse Cave.

NRA WE DO OUR PART

The heater that smiles while it warms

FRASER

Radiant Front Console

Imagine a circulating heater with all the added advantages of a cheerful open fireplace. It is absolutely new—a revolutionary contribution to gas heating.

Manufactured by

Fraser Furnace Company

Stockton, California

Distributed by

H. R. Basford Company

San Francisco Los Angeles

Worthwhile Program On Soil Corrosion

PRACTICALLY every organization interested in the maintenance of underground structures was represented at the soil corrosion conference held in Los Angeles, on the afternoon of May 10, 1934. Those in attendance, to the number of approximately 150, came from gas, oil, telephone, street railways, water and electric distributing companies; also represented were numerous companies interested in the production and sales of steel, cast iron, copper and alloys, and in the production, sales and application of protective coatings.

The conference was organized and presided over by W. M. Henderson, superintendent of gas distribution for the Los Angeles Gas and Electric Corp., and was held in the corporation's main office building auditorium.

The meeting was arranged to take advantage of the presence in Los Angeles of Dr. K. H. Logan, Chief, Underground Corrosion Section, U. S. Bureau of Standards, and Dr. Gordon Scott, Research Associate, American Petroleum Institute.

The first speaker, Dr. U. B. Bray, of the Research Department, Union Oil Co. of California presented a paper written in collaboration with F. S. Scott of the same company, and entitled "Specifications for a Modern System of Bituminous Pipe Line Protection." An abstract of this paper will appear in *Western Gas* for July.

The second speaker was O. L. Wrestler of the Los Angeles Gas and Electric Corp., who presented a paper written by himself and H. V. Buffington of the same corporation, on the subject of "A study of Pitting Data on Bare Steel Pipe in Southern California Soils." An abstract of this paper will be found on Page 15.

Considerable discussion was had on both of these papers. Dr. Gordon Scott, commenting on the latter, stressed the extreme complexity of pitting data studies, and the necessity for carefully analyzing a large number of measurements before reaching conclusions. By blackboard drawings he illustrated how a given soil, causing a limited number of deep pits, would not be actually so destructive as another soil giving a larger number of pits of lesser depth.

Commenting on corrosion in general, Dr. K. H. Logan expressed the thought that sufficient data should now have been collected to permit the drawing of basic generalizations and conclusions on the cause and prevention of corrosion. He reminded his listeners of the theory, advanced some time ago, that corrosion underground is caused by "differential aeration," whereby adjacent portions of the structure are subjected to different concentrations of oxygen, setting up electrical effects tending to cause corrosion at the points of lower oxygen content. For instance, a hard earth clod pressing against the pipe with more force or intimate contact than the surrounding soil would cause corrosion at the point of contact; cracks in the earth, leading down to the pipe, would permit of high concentration of oxygen at the pipe surface, and promote corrosion elsewhere; careless backfilling procedure and lack of tamping would cause voids beneath the pipe and a similar corrosion result.

Again, a non-uniform coating, presenting pin-holes or other openings, would promote localized current discharge and pitting, which would be reduced if the coating were more uniform and gave larger anodic surfaces. From the differential aeration standpoint, the function of a coating would be to decrease the differential while the soil is settling.

The chairman then introduced the third speaker, Ira D. Van Giesen, electrolysis engineer, Los Angeles Department of Water and Power, who presented a paper entitled "Second Report on the Corrosive Effect of Horizontal Soil Strata." This was a continuation of a report made to the Third Bureau of Standards Soil Corrosion Conference, held in Los Angeles in 1933. The author described the condition of a section of 36-inch water main installed in Los Angeles in 1924 and replaced in 1933 because of severe corrosion. This corrosion was attributed to existence of varying narrow horizontal strata through which the pipe ran, contacting two or more strata at one time because of its large diameter, and suffering because of electric potential set up between these strata. A large diagram graphically illustrated the pipe's position with respect to these soil layers, the degree of corrosion, and the resistance of the various soils. The corroded areas were shown to be coincident with the low resistance soils, and vice versa.

To counteract this corrosive condition, the new pipe was heavily coated with bitumen, and laid in a 6-inch peripheral blanket of screened river sand, the purpose of the latter being to prevent soil stress on the protective coating, to prevent contact of the pipe with varying soil strata, and to establish a drainage zone wherein soil solutions could equalize and so prevent formation of ionic concentration cells.

Considerable discussion followed this paper also. The thought was expressed that the "silicide" coating formed on sandcast cast iron pipe had some protective value; that a dip coat on cast iron at least facilitated cleaning before re-installation; and that a paint or even primer coat on steel pipe had at least the advantage of permitting easier cleaning prior to reconditioning.

After the meeting was adjourned, a number remained to inspect samples of metals, alloys and non-metals that had been removed the day before, by Dr. Logan, from one of the Los Angeles burial locations.

The Goodman Stopper

GOODMAN USED SINCE 1897 2" HANDLE & LOCKING SLEEVE GAS MAIN STOPPER

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

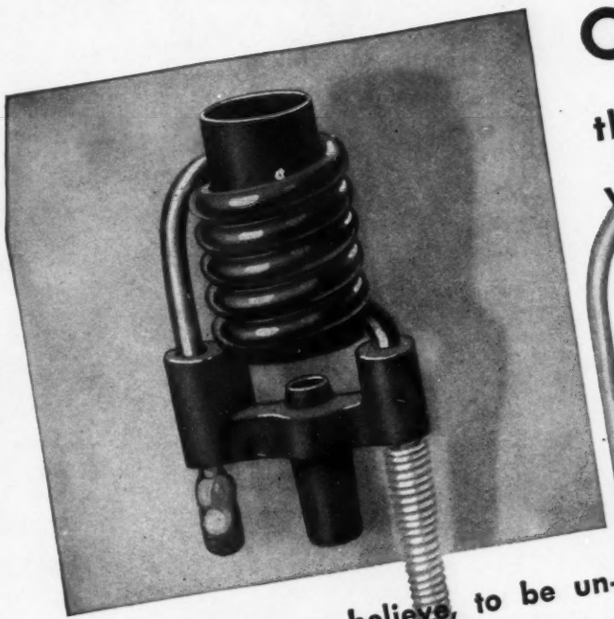
Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California

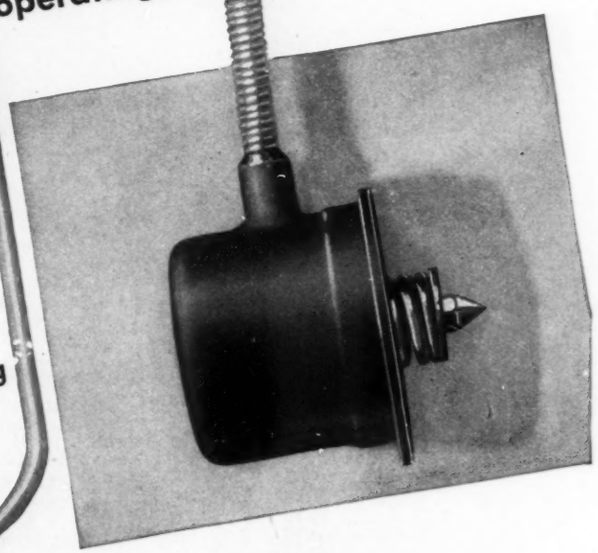
NRA WE DO OUR PART

5 YEAR GUARANTEE

ON

the new A. G. P. Thermostatic Vapor Tension Pilots used on Ideal Gas Boilers, Ideal & Red-flash Convertors under normal operating conditions.





A guarantee, we believe, to be unprecedented in the manufacture of thermostatic pilots. Our confidence is based on the use of pure nickel tubing over copper.

AMERICAN GAS PRODUCTS CORPORATION

40 WEST 40th STREET, NEW YORK, N. Y.

Division of AMERICAN RADIATOR COMPANY

New El Paso Home for Texas Cities Gas Co.

THE Texas Cities Gas Co., El Paso, Texas, has moved into its new quarters in the Nebham Building, located two blocks from the heart of the business district. The building has been leased for a period of 10 years with an additional five-year option. It has been entirely remodeled and is the newest and most modern unit on the company's system.

Half of the main floor is occupied by the commercial department and the general office, while the balance is used as an appliance display section. The mezzanine floor is given over to private offices of the company district office executives. On the second floor of the building are located the billing department and assembly rooms for company salesmen.

125-Mile Pipe Line Contemplated To Supply Rio Grande Valley

Construction of a 125-mile, 12-inch natural gas pipe line is being contemplated by a group in Dallas, Texas, and Tulsa, Okla. The line would originate from fields in Starr County, Texas, and would supply towns in the lower Rio Grande Valley. Cost of the line would be between $600,000 and $750,000, according to J. N. Goodwin of McAllen, Texas, one of those interested in the project.

James F. Orr With Central Illinois Public Service Co.

James F. Orr, formerly commercial manager of the United Gas System, Houston, Texas, has been elected vice-president and commercial manager of the Central Illinois Public Service Co. of Springfield, Ill. The company serves both manufactured and natural gas to approximately 21,500 consumers in its territory, maintaining district offices at Mattoon and Quincy, Ill.

New Publications Issued By Republic Steel Corp.

A new booklet, Bulletin 125, on Enduro 18-8 stainless steel, is available from Republic Steel Corp., Central Alloy division, Massillon, Ohio. The 16-page brochure contains data on the Enduro 18-8 series of types, which include Enduro 18-8-S, 18-8-STi, 18-8-SMO and 18-8-FM. Metallurgical and fabrication information is given. An important feature of the booklet is a table of laboratory corrosion data listing the degree of corrosion-resistance of Enduro 18-8 stainless steel, Enduro AA and Enduro S to each of more than 300 chemical reagents, solutions and products under varying conditions of temperature and concentration.

A folder, Bulletin 120, has also been released explaining metallurgical reasons for the adherence of the zinc coating on Republic Galvannealed Sheets, and detailing the characteristics of these sheets. A large number of recommended applications are listed and several are illustrated.

T. J. Strickler Elected Director U. S. Chamber of Commerce

T. J. Strickler, of Kansas City, Mo., has been elected a director of the United States Chamber of Commerce, to represent Election District No. 7. Mr. Strickler is a past president of the Missouri Association of Public Utilities, past chairman of the Natural Gas Department of the American Gas Association, and a former director of the Oklahoma Utilities Association.

Another utility man to be elected to the directorate was J. F. Owens, president of Oklahoma Gas & Electric Co., Oklahoma City.

Municipal Gas Plant for Sedgwick

Sedgwick, Kan., has awarded a contract to the Hefling-Hughes Engineering Co. of Hutchinson, Kan., to survey and draw up plans for the construction of a municipal natural gas distribution system. Supply would come from a field about 25 miles distant, which also supplies Halstead, Kan.

Electrogas

Newest Development!

★

FURNACE BLOWER UNITS

application of ELECTROGAS Streamline principle

Produced in 5 series and available in 81 sizes of domestic and commercial models. Fitted with filters and slow speed, quiet blowers.

Built For Economy

Send for Details!

◆

ELECTROGAS FURNACE & MFG. CO.

2575 Bayshore Blvd.
San Francisco, Calif.

164 South Central Ave.
Los Angeles, Calif.

NATION-WIDE ACTIVITY ON GAS REFRIGERATION SHATTERS ALL PREVIOUS SALES RECORDS

USES NO WATER

FIVE MONTHS AGO we prophesied a great year for gas refrigeration in 1934! But even our fondest hopes did not encompass such tremendous increases as have been achieved in Electrolux sales since January 1st. The early enthusiastic activity of gas companies has been sustained and augmented in cities and towns from coast to coast.

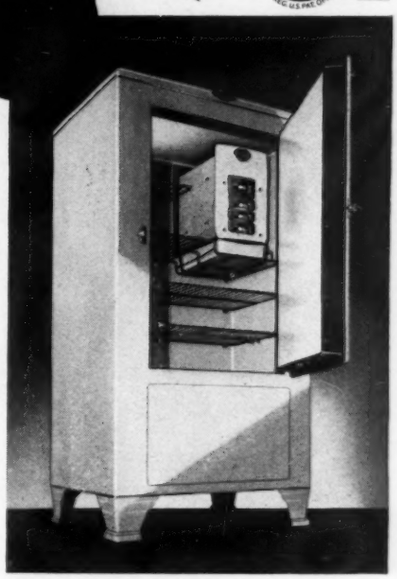
SUMMER SALES

And hot summer weather is just beginning! Days when families will realize more than ever their need of automatic refrigeration. Days when your salesmen can bring home at the psychological time the superior advantages of gas refrigeration. The added efforts which your company puts behind Electrolux during the coming months will repay you many times over.

BUILDS GOODWILL

For, not only does every Electrolux you install add 1500 cu. ft. to a consumer's present requirements—it builds important goodwill for your company by providing customers with the most dependable, economical refrigeration yet perfected—publicizes the modernity of gas for every kitchen use.

Right now plan your summer sales program to take advantage of the big opportunity to make the refrigerators sold in your territory *gas* refrigerators! For sales and merchandising help, write, wire or phone Electrolux Refrigerator Sales, Inc., Evansville, Ind.



NEW *Air-Cooled*
ELECTROLUX
THE SERVEL *Gas* REFRIGERATOR

April Winners in Gas Refrigeration Contest Named

CASH prizes for the first month of the nation-wide gas refrigeration sales campaign sponsored by the A.G.A. Refrigeration Committee have just been awarded to six gas companies, with 18 companies receiving honorable mention for their h'gh record of April installations of Electrolux refrigerators, Ronald A. Malony, chairman of the Committee, announces from A.G.A. headquarters.

The April prizes were distributed as follows: Southern California Gas Co., Los Angeles, H. E. Davidson, sales manager; Dallas Gas Co., Dallas, Texas, C. K. Patton, general sales manager; Metropolitan Utilities District, Omaha, Nebraska, Frank Landers, sales manager; The Tampa Gas Co., Tampa, Fla., H. S. Dossel, sales manager; Community Natural Gas Co., Eastland, Texas, F. V. Williams, manager; Municipal Gas Co., Hillsboro, Texas, Elder L. Buelow, manager.

Refrigerator sales of the Southern California Gas Co., winner of the April prize in the Class A group, represent 508 per cent of the company quota. The quota was 142 boxes, which was 20 per cent over the April, 1933, sales for the same month. Included in the company's sales for April are those of dealers which operate as commission sales agents for the gas company.

"MODERNIZE as you repair"

THE SPRAGUE METER COMPANY

BRIDGEPORT, CONN.

Los Angeles, Calif. San Francisco, Calif.

Davenport, Iowa

Newark, Ohio. Houston, Texas.

Texas Gas Utilities Co. In Receivership

H. L. Mann has been named receiver for the Texas Gas Utilities Co., headquartering in Del Rio, Texas. District offices are maintained at Carrizo Springs, Crystal City, Eagle Pass, La Pryor, and Ulvalde, Texas. Mr. Mann was formerly general manager of the company. Other officers included John J. Klise, president, and R. H. Hurd, assistant treasurer. The Texas Gas Utilities Co. is a subsidiary of the Commonwealth Gas Corp. of Charleston, W. Va., which instigated the receivership proceedings.

William Mitchell McKee, President of Chaplin-Fulton, Dies

William Mitchell McKee, widely known in the gas and power plant industries, both personally and as president of The Chaplin-Fulton Manufacturing Co., died at his home in Pittsburgh, Pa., on Thursday, April 26th. He was 58 years of age.

Mr. McKee came to this country from Ireland at the age of 18 and immediately settled in Pittsburgh, where he had remained ever since. In 1910 he became auditor and eventually president of The Chaplin-Fulton Co.

50-Mile Pipe Line to Houston Proposed For Industrial Users

Paramount Natural Gasoline Co., Houston, Texas, contemplates construction of a 50-mile, 10-inch high-pressure pipe line from the Pledger Dome field to Houston, Texas. The proposed pipe line would have a daily capacity of 50,000,000 cubic feet of gas and its construction would cost approximately $450,000. The line would serve industries only. Harry Pennington, San Antonio, is head of the Paramount company's natural gas division.

Fisher Gov. Co. Appoints New Agent

The Fisher Governor Co., Marshalltown, Iowa, manufacturers of automatic control equipment, has announced the appointment, effective June 1, of Harry T. Weeks, manager, the Weeks Engineering Co., St. Louis, Mo., as factory representative for the St. Louis territory.

Maids Course Held in San Antonio

The Home Service Department of the San Antonio (Texas) Public Service Co., recently awarded certificates to 24 graduates of the company's 8-weeks course for maids. The course dealt with advanced cooking and fundamentals of household efficiency.

Hays of Knox Utility Corp. Passes

Victor A. Hays, purchasing agent of the Knox Utility Corp. at Vincennes, Ind., died early in May. Mr. Hays was for a number of years connected with the Southwestern Development Co. of Independence, Kan. He left that company in 1931 and within a few months joined the Knox Utility Corp.

GET SET

for

THE UNITED INDUSTRY

Summer

GAS HEATING CAMPAIGN

JUNE · JULY · AUGUST

$30,850.00

IN PROMOTIONAL ADVERTISING TO SUPPORT YOUR **TIE-INS.**

DETAILS TO BE ANNOUNCED SOON

P · G · and E ·

PACIFIC GAS AND ELECTRIC COMPANY

Owned · Operated · Managed by Californians

WA 206-634

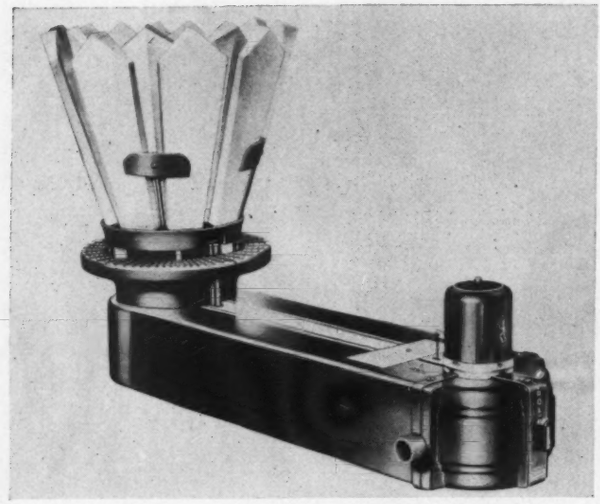


Illustration at left shows Surface Combustion Corp.'s Janitrol conversion burner. New unit has combined several parts of control mechanism into one assembly. Electrical pilot lighting device has also been added.

Janitrol Conversion Burner In New Design

SURFACE Combustion Corp., Toledo, Ohio, makes announcement of its redesigned Janitrol conversion burner which has many new features making for attractiveness and simplicity. Several parts of the control mechanism have been combined into one assembly, housed inside the front end of the secondary air duct. An electrical pilot lighting device has also been added. A more compact assembly has eliminated the piping previously used, facilitating installation problems.

The various parts of the unit are cast of an aluminum alloy, combining strength and durability with minimum weight.

The control assembly was concealed not only for added appearance value but to protect the control parts from dirt and maladjustment.

To improve appearance all corners of the secondary air duct have been rounded off and the ends of the duct made semi-circular. This design has necessitated stamped steel sections, assembled by spot welding, thus increasing strength and rigidity of the duct.

The unit is finished in a two-color lacquer.

Burner heads in the new unit have been redesigned for reduction of noise accompanying ignition and extinguishing of the burners.

The electrical lighter feature of the new Janitrol incorporates finger-tip control through a single cock on the front end of the unit. By turning this cock from *off* to *on,* the gas supply to the pilot is opened. A short forward thrust on the cock handle, while in the *on* position, opens the gas supply to a small lighter which is ignited by a coil simultaneously heated by electricity. The lighter, in turn, ignites the pilot. Releasing the handle of the cock extinguishes the lighter and cuts off the current. As a safety precaution, a small two-way toggle switch cuts out the lighter circuit when the electrically controlled main gas valve is in operation and vice-versa.

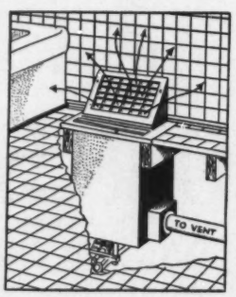
WARD WALL-HE-TOR

Economical gas heat for the bathroom

Now for the first time in gas history, a vented appliance, ornamental, and taking up little space, is available for bathrooms. This has been made possible by the Ward Wall-He-Tor, which will heat the average bathroom for as little as half-a-cent an hour, depending upon local gas rates.

Wall-He-Tors are ideal for dens, breakfast rooms, and small bedrooms. They may also be used as unit systems for houses without basements.

Write for literature, terms, and prices. Ask about Ward Floor Furnaces with Bilt-In Thermo-Control.



WARD HEATER COMPANY
1800 W. Washington Blvd.
Phone PArkway 9171 Los Angeles, Cal.

GENERAL CERAMICS COMPANY
• REFRACTORIES •

Refractories for conversion burners, space heaters, and circulating heaters. Made to exacting standards of quality—standards which are maintained by modern production methods, careful workmanship, and accurately controlled burning. Our engineers will gladly cooperate on new designs, alterations, production economies, etc.

General Ceramics Company, 71 West 35th Street, New York

S. H. Taylor, Jr. Appointed Pacific Coast Manager of Lincoln Electric

Seth H. Taylor, Jr., has been appointed Pacific Coast manager for The Lincoln Electric Co., Cleveland, Ohio, and will make his headquarters at San Francisco. For the last four years Mr. Taylor has been in charge of the Los Angeles office of The Lincoln Electric Co. Previous to that he spent considerable time at the Cleveland headquarters of that organization where he was engaged in research and applications of production welding.

S. H. Taylor, Jr.

Since his graduation from Western University, Mr. Taylor has been constantly active in one branch or another of the arc welding industry. He has the distinction of being partly responsible for one of the first arc welded office buildings ever to be erected.

Johnson Bill Made Law by President's Signature

On May 16 President Roosevelt affixed his signature to the Johnson Bill, which prevents utilities from taking recourse to federal courts on appeals from state or municipal rate rulings. Utility companies are thus limited to state courts, though appeal may of course be taken from state supreme courts to the U. S. Supreme Court.

Wyatt Goes To Georgetown For Community Natural

B. A. Wyatt, formerly manager of the Community Natural Gas Co.'s Itasco district office, has been transferred to Georgetown, Texas, as district manager for the company, replacing H. V. Smith who has been made manager of the Taylor office, as announced in the May issue of *Western Gas.*

THE LACLEDE GAS LIGHT COMPANY
SAINT LOUIS

LACLEDE GAS BUILDING
OLIVE AT ELEVENTH

March 5, 1934.

Minneapolis Honeywell Regulator Co.,
2831 Olive Street,
St. Louis, Missouri.

Gentlemen:

I am sure you will be interested in the enclosed temperature graph, taken at home of Dr. F. J. Taussig, 50 Westmoreland Place. The house is very large,- 65,800 cu. ft. content, - and is heated by a combination warm-air and hot-water furnace. A difficult job to control, but simple for a Chronotherm.

It is jobs like this that has sold everyone in our department on Chronotherm. Service calls are one-half what they were last year. "Cold 70" complaints are practically eliminated. Result;- by far the majority of house heating orders specify Chronotherm.

But where I hear the most of Chronotherm is at home. We formerly had a plain room thermostat and now have a Chronotherm, which Mrs. Thompson thinks is the greatest piece of mechanism that has come into the house. She cannot get over the fact that everytime she looks at the thermometer it is right on 70. It has completely cured her of "thermostat jiggling", which is quite an accomplishment, with a child on the floor.

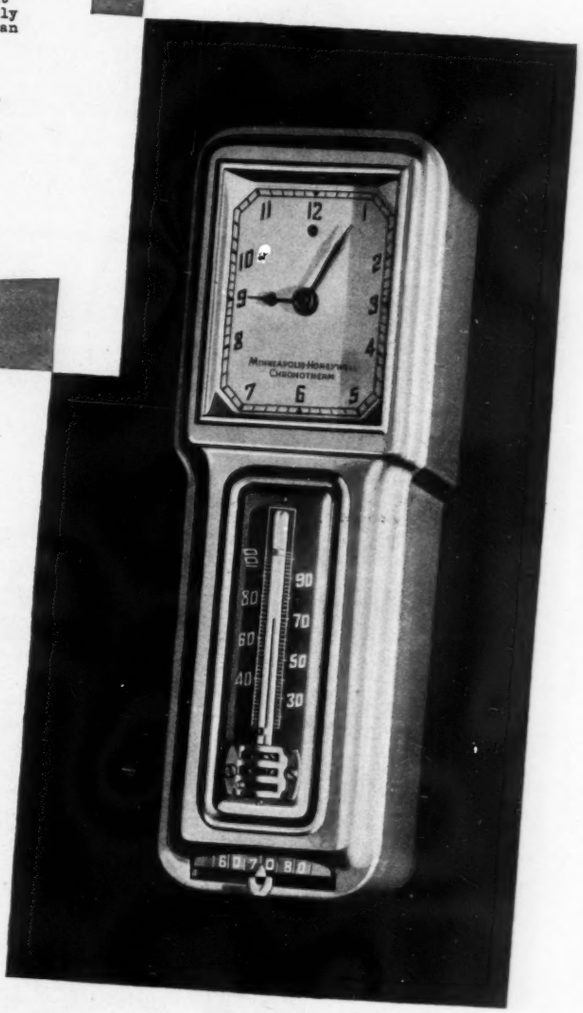
Very truly yours,

LACLEDE GAS LIGHT COMPANY

W. D. Thompson, Manager,
Industrial Department.

WDT:LC
Encl.

THERMOTSAT JIGGLING: The art of meddling with the thermostat setting at frequent intervals in an attempt to accomplish what the Chronotherm* does automatically . . .



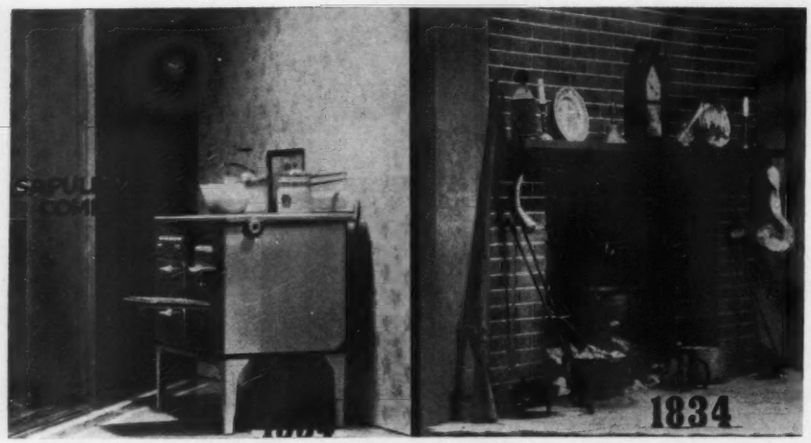
NO THERMOSTAT *Jiggling* WITH CHRONOTHERM

MR. THOMPSON is an experienced gas heating engineer, and his opinions bear weight. "A difficult job . . . simple for Chronotherm*. Everyone sold. Service calls cut in half. Cold 70° complaints eliminated . . . and a cure for thermostat jiggling." . . . All this from one instrument — the Chronotherm*! Minneapolis-Honeywell Regulator Company, 401 East Twenty-eighth Street, Minneapolis, Minn.

★ Formerly Called Thermochron

MINNEAPOLIS-HONEYWELL

Control Systems



Sapulpa Institutional Campaign Is Different

SAPULPA (Okla.) Gas Co., of which R. E. Aitcheson is president, is giving a good deal of thought these days to putting a punch into its institutional messages to consumers. Advertising, window display, and publicity efforts of the company are producing some unusually interesting appeals to consumer attention.

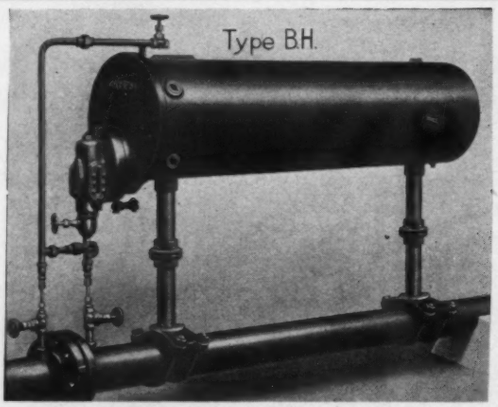
Much emphasis is being placed by the company upon industrial activities in Sapulpa. A recent window display at company headquarters was devoted to the products of some 37 local industries, and newspaper advertising called attention to the window, urging patronage of local manufacturers. The gas company also sponsored a Sapulpa industry exhibit at the Magic Empire Exposition held in Tulsa early in April, the booth featuring products of Sapulpa industries.

Reproduced above is a window shown last March by the Sapulpa Gas company, contrasting kitchen equipment of 1834 with the modern variety. Many of the household articles and implements shown in the 1834 kitchen "made the run" into Oklahoma, some of them antidating the Revolutionary War.

Another recent window activity centered about the Parent-Teachers' Association and the domestic science class of the Sapulpa high school. From these organizations representatives were selected who conducted baking demonstrations in the gas company's window, cakes being sold and proceeds going to the Parent-Teachers' Association.

Much favorable comment has resulted from the company's institutional and goodwill activities of the type illustrated above.

PAPICO
ODORIZER Features
Continuous, automatic operation.
Odorant waste prevented.
Lowest operating cost.
Odorant injection substantially proportional to gas flow.
Bulletin No. 05 gives full details.
HARRY F. HALDEMAN, Inc.
Engineered Products
411 W. Fifth St., Los Angeles, Calif.



Johnson Melting Furnaces
Fast—efficient—dependable
The Johnson line of melting furnaces includes a wide range of sizes. The unit shown is the No. 15, which will heat a capacity of 18 pounds of lead in less than 10 minutes. Numerous other models are available, with capacities up to 600 pounds of lead.
Write for complete catalog and price list.
JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA
Pacific Coast Representative—C. B. BABCOCK CO.
135 Bluxome St., San Francisco, Calif.

United Gas System to Award N. C. McGowen Refrigeration Trophy

SUPPLEMENTING the national Go-Getter Contest on Electrolux refrigerators, being sponsored by the American Gas Association, the United Gas System Is conducting a special local contest under the direction of E. M. Cannon, sales manager for the System.

N. C. McGowen, chief executive of the United Gas System, is offering to the company's district offices an award known as the N. C. McGowen Trophy for refrigeration achievement during April, May and June. The trophy must be won twice before it becomes the permanent possession of any district. There will also be $320 in prizes at stake for districts selling the greatest percentage of quota each month and for the three-month period of the campaign.

The System has introduced a four-page, tabloid-newspaper-size publication, "The Go-Getter Gazette," as official publication for the refrigeration campaign.

Geo. L. Myers Assistant Secretary of Portland Gas & Coke Co.

Geo. L. Myers, formerly assistant to the president of the Portland (Ore.) Gas & Coke Company, has been made assistant secretary of that company, Northwestern Electric Co. and the Pacific Power & Light Co. He has been with the two former companies since 1910, and with the Northwestern Electric since 1925. Mr. Myers began as stenographer, was promoted to secretary, and finally made assistant to the president of the Portland Gas & Coke Co. and the Pacific Power & Light Co.

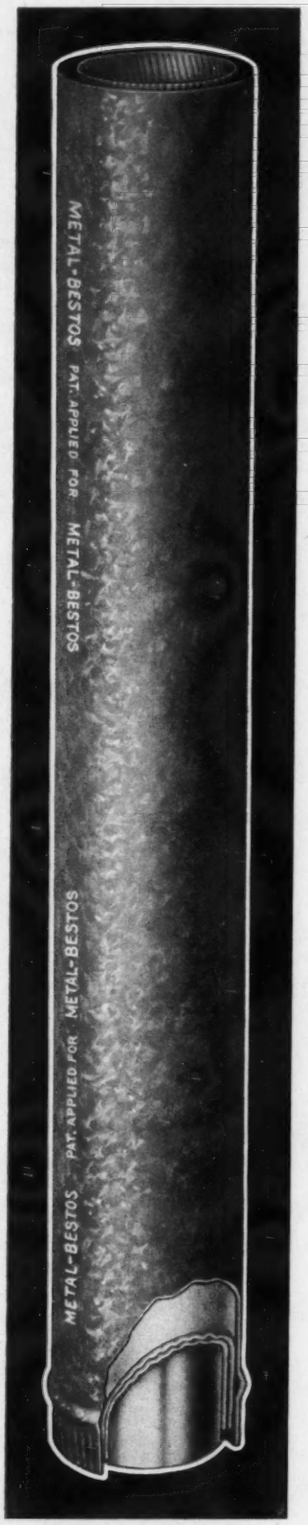
He has been active in the Pacific Coast Gas Association for many years, his service including two terms as general chairman of the Public Relations Section in 1930 and 1931.

Board of Directors for Consumers Gas Corp. Named

W. J. Coleman, Carl Lindh, and Carl A. Johnson, have been named directors of the Consumers Gas Corp., Bend, Ore., recently organized to succeed the Natural Gas Corp. of Oregon in that community. Norman Coleman, in charge of the Bend plant for several years, has been retained as manager.

Announcing...

METAL-BESTOS GAS VENT *and* FLUE PIPE



NEW in design and construction, yet old in principle, this pipe is now offered to the trade as being the most efficient, durable and safe pipe on the market—not "just another pipe." It is as carefully and faultlessly designed and constructed, in relation to gas and gas appliances, as modern engineering and manufacturing facilities make possible.

METAL-BESTOS is the most efficient pipe because of its high insulating value, there being one half inch of asbestos around inner pipe and fittings. It is most durable because the inner shell is made of 99% pure aluminum—the metal so extensively used in the manufacture of cooking utensils which stand up under the action of direct gas flames indefinitely. It is safer because of its always cool outside surface which eliminates fire hazard, because its crimped opposite ends of inner and outer pipes and fittings make for leak-proof connections and because the outside galvanized iron jacket protects the insulation against disintegration through exposure to moisture.

In keeping with PAYNE policy and products, METAL-BESTOS has been time tested before being offered to the trade. Actual installations and severe heat and acid tests have proved conclusively the merits of this product and building inspectors are daily endorsing its use in leading cities and towns.

Trial installations will prove the following points:

1... Better and quicker draft.
2... Improved combustion.
3... Elimination of excessive condensing of combustion products.
4... Longer life of appliance.
5... Less fire hazard.
6... Lower installation cost.

Write us for descriptive folder and price list covering METAL BESTOS *. . . . the aluminum lined gas vent.*

A New Payne Product

Manufactured by

PAYNE FURNACE & SUPPLY COMPANY

Established 1912

Beverly Hills, California

Checked and Double Checked

the "Blue Book"

PERSONNEL DIRECTORY of the Gas Industry

1934 EDITION

This directory gives the personnel of gas utility district offices as well as headquarter companies, arranged by states and including distributing companies, pipe line companies, producing companies and holding companies. Each distributing company lists the kind of gas served — pressure—B.t.u. content—number of meters—and indicates whether or not each company merchandises.

Correct as of January 1, 1934, it is the most complete and up-to-date directory available—includes the entire United States.

176 pages

Published in convenient Pocket Size! 5 x 7 in.

1-10 copies $2.50 ea.
10-20 copies $2.00 ea.
20 or more $1.50 ea.

MAIL COUPON TODAY!

WESTERN GAS, "Publishers",
810 South Spring Street,
Los Angeles, California.

Date.....

Please send me.....copies of the "Blue Book" Personnel Directory, 1934 Edition, of the Gas Industry at $..... per copy, for which I enclose remittance of $.....

Company name.....

Address .....

Natural Gas House Heating In Tucson, Arizona

(Continued from Page 14)

50. B.t.u. per hr. per sq. ft. of glass and doors.
16. B.t.u. per hr. per sq. ft. of net wall.
7. B.t.u. per hr. per sq. ft. of cold ceiling.
.720 B.t.u. per hr. per cu. ft. of air (1 change per hr.)

(Cold floor not taken into consideration. Temperature rise from 30 to 75 degrees.)

The Tucson heating season starts about the 15th day of October and ends about the 10th of May. We have worked up a percentage of fuel requirements for the closest reading date to the 6th, 11th, 16th, 21st, 26th, and 31st of each month. Actual heating requirements are over a period of six months, 21 days; where the meter reading date falls after the 16th of the month the heating cost will be in gas bills for an eight-month period. When the reading date comes before the 16th, the gas heating cost will be over a seven month period. The demand for heating, month to month, is estimated as follows:

Observation of night consumption to hold room temperatures to 60 degrees, during the past season showed that the temperature did not fall below 62 degrees in front living rooms where room thermostats were installed, on any of the coldest nights.

Sale of natural gas for house heating in Tucson presents more of a problem than it does in colder climates, when the customer compares the cost of gas fuel against coal. In the colder climate the coal and gas are in direct proportion to the degree days, and coal is required to the very last of the season; whereas in Tucson, throughout October, November, April and May the mornings and evenings are such that the customer feels he can more easily stand the chills of the house for one or two hours than the trouble and inconvenience of fire kindling. This results in 20 per cent less coal being burned than is necessary to give the home owner complete heating comfort throughout the entire season. With natural gas, where the use of a match or moving up the room thermostat is all that is required to get the one or two hours of comfort, the customer is going to avail himself of it readily.

From a study of the accompanying chart on comparative fuel costs it will be noted that all three fuels are based on 2017 degree days. Gas and oil costs are worked out for a central heating plant, thermostatically controlled; coal costs are for hand fired installations. The coal costs are considerably higher than either gas or oil. However, this chart is based upon the amount of fuel that should be used to maintain a temperature of 75 degrees in the home for the full 2017 degree day. As explained before, the customer would in all probability use 20 per cent less coal than is shown on this chart, and receive 20 per cent less heating comfort at a cost which would still exceed that of natural gas.

"Derby" Contest for Minnesota Northern Power Co.

AROUND the colorful theme of the Derby, the Minnesota Northern Power Co., Minneapolis, Minn., is centering its annual spring sales activity. At the company's third annual sales conference, A. E. Schwarz, commercial manager and W. L. Hayes, new business manager, gave details of the three-month sales program to division managements and sales staffs. The conference was held in April at Miles City, Mont.

A. E. Schwarz

The exhibit hall in which the conference took place was decorated to form a background for the Derby contest. A screen 8 feet high and 196 feet long represented paddocks, on each side of the room, with separate stables for each horse. At the back of the hall was a betting booth and at the front was a judges stand, which served as speakers stand for the meeting.

No detail of turf atmosphere was overlooked—everyone present wore a jockey cap; banquet tables were built in the shape of a horseshoe. Sales events for April, May, and June were set up as individual races, one on refrigeration, one on water heating, and one on cooking.

A Grand Sweepstakes prize is at stake, to go to the division showing the greatest dollar sales per customer during the three months of the activity.

All sales accomplishments are judged on a per meter basis for competition between divisions. Carrying out the Derby theme, each division is represented by a horse, with division managers acting as trainers and salesmen as jockeys. As an additional interest-builder Pari-Mutuel betting has been introduced for the campaign, enabling participating salesmen to back their favorite divisions to win, place or show in the prize money.

Trip-L-Duty Spark Is New Hammer-Bray Product

Hammer-Bray Co., Oakland, Calif., showed its new Trip-L-Duty Spark gas range for the first time during Gas Range Week, held in northern California in April. Trip-L-Duty, according to George Hammer, president of the company, signifies the three important functions of the new model, cooking, trash burning, and heating. The new range incorporates a 20,000 B.t.u. circulating heater as well as a full-size trash burner.

The Trip-L-Duty Spark is equipped with acid resisting oven top, which prevents fruit juice stains; also an electric lamp and time clock, and a condiment set.

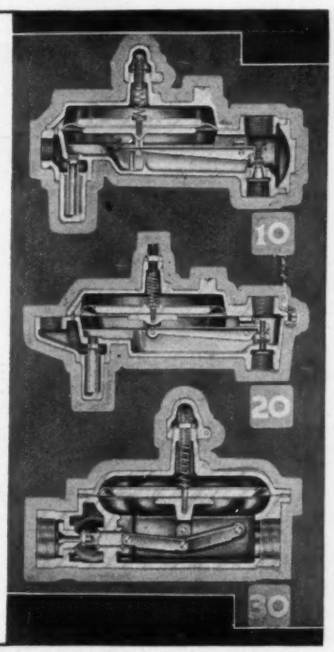
THE REAL TEST

Ten, twenty, forty, or more years in service under all kinds of conditions is the real test of a Gas Regulator. Reynolds have investigated one after another of their installations that have been in use for periods extending over ten to forty years. In all cases these investigations have been very satisfactory. Following through their investigation of these units, Reynolds checked particularly upon three major requirements that are important for successful Gas Regulation: 1. Economy in relation to first cost and upkeep. 2. Mechanical efficiency in handling delivery demands. 3. Uniformity of delivery pressure, even though inlet pressure and volume vary. This check up by Reynolds was done for only one reason, to verify the dependability of their units with actual facts from the field and to furnish the men in the field with "Real Test" information proving the superiority of REYNOLDS GAS REGULATORS. Write for complete information concerning your gas control problems.

Model 10–all parts accessible and interchangeable while in pipe line.

Model 20–working parts so accurate as to permit complete interchangeability in shop.

Model 30–is manufactured in either spring or dead weight adjustment for horizontal or vertical connections.



REPRESENTATIVES

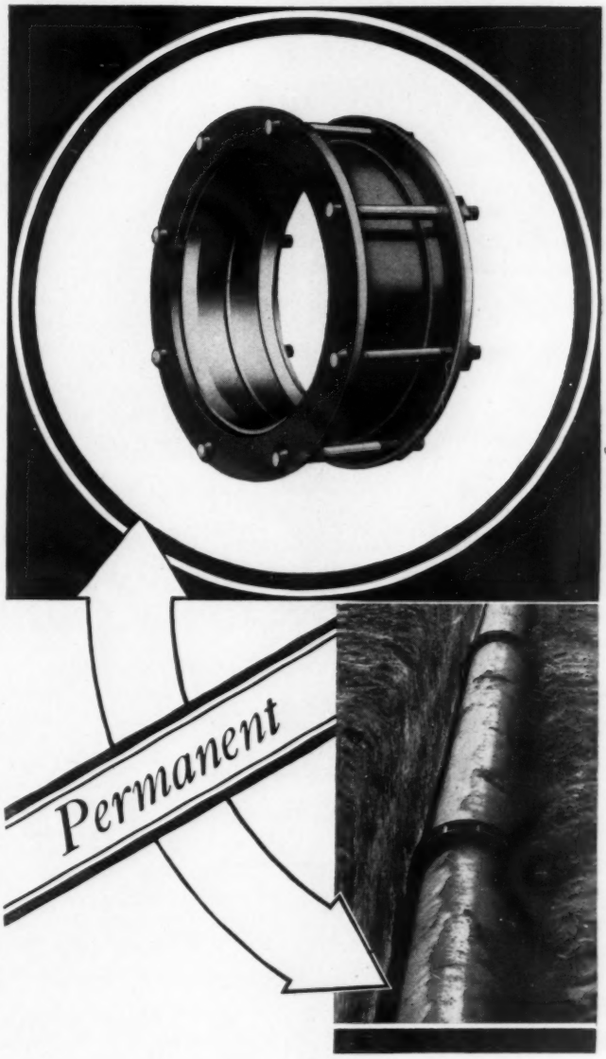
Eastern Appliance Company.....Boston, Massachusetts
F. E. Newberry.....Avon, New Jersey
G. H. Unkefer, 428 Boyd Street . Los Angeles, California

REYNOLDS BRANCH OFFICES

421 Dwight Building.....Kansas City, Missouri
2nd Unit, Santa Fe Building.....Dallas, Texas

REYNOLDS GAS REGULATOR COMPANY
Anderson, Indiana, U. S. A.

GAS CONTROL SINCE 1892



Dayton Couplings provide permanent construction for any gas line, and their strength and flexibility assure a permanently tight joint, rendering constant, unfailing service as long as the line remains in use.

THE NATIONAL-SUPERIOR CO.
DAYTON PIPE COUPLING DIVISION
DAYTON, OHIO

NEW *Sales Literature*

Now Available!

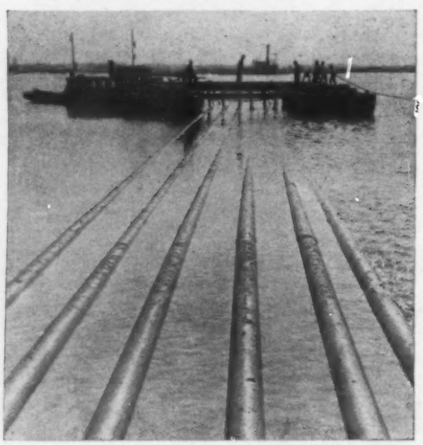
Pacific
GAS HEATING HEADQUARTERS

Our Line for 1934!

- FLOOR FURNACES
- CABINET HEATERS
- WALL HEATERS
- GAS STEAM RADIATORS
- RADIANT HEATERS
- WATER HEATERS
- GRAVITY FURNACES
- FORCED AIR FURNACES
- UNIT HEATERS

The Outstanding Gas Appliance Line of the Pacific Coast. Write for complete information on any or all items . . .

Pacific Gas Radiator Co.
Main Office and Factory
Huntington Park, California
Oldest and Largest Manufacturer of Gas Heating Appliances in the West



Down with Father Neptune in 1926, these gas pipe lines treated with NO-OX-ID fared so well in resisting the onslaughts of rust and corrosion that the owner company has long since adopted NO-OX-ID on all river crossings. Naturally they call upon NO-OX-ID also for protection of pipe buried in soil. Time only strengthens the standing of NO-OX-ID in carrying its distinguished responsibilities. A capable consulting staff is placed at your disposal in reply to any inquiry.

DEARBORN CHEMICAL COMPANY
CHICAGO NEW YORK
LOS ANGELES
807 Mateo Street, Phone TRinity 3385
SAN FRANCISCO
421 Bryant St. Phone SUtter 8688

NO-OX-ID
IRON-RUST
The Original Rust Preventive

Payne Furnace & Supply Announces Metal-Bestos Venting Pipe

The Payne Furnace & Supply Co., Beverly Hills, Calif., has added Metal-bestos, a new type of gas vent and flue pipe developed by the company, to its line of products.

Metal-bestos is composed of an inner aluminum tube around which are wound two plies of ¼-inch aircell asbestos paper. An outer casing of galvanized iron surrounds the aluminum pipe and insulation. The assembling of pipe is done in such a way as to allow the inner tube to be pulled out to any desired length in order to facilitate joining and cutting. All fittings are of similar double construction.

Installations of the new pipe have been made under severe heat and acid conditions to demonstrate the non-corrosive and insulating qualifications of the product.

"Appeal to the Public" Is Advice of Investors' Group

Public Utility companies are urged to enter upon a national campaign of publicity and advertising in their own defense, in an appeal issued last month by Chester D. Tripp, chairman of the executive committee of the American Federation of Utility Investors, Inc. The suggested campaign would take the form of individual campaigns by local companies in local newspapers. The communication sent utility companies on May 6 by Mr. Tripp placed a great deal of the blame for public misunderstanding of utilities at the door of utility managements who have neglected to adequately develop their public relations.

Iowa Pledge Warrants Must Pass "Blue Sky" Department

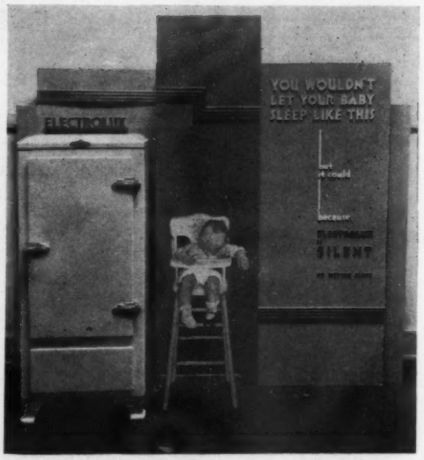
Pledge warrants for building municipal plants in Iowa, issued under the Iowa Simmer Law, may no longer be issued unless qualified under provisions of the Iowa Securities Act. A ruling to this effect by the Iowa Securities Department and the attorney general has been sustained in the Polk County, Iowa district court. Pledge warrants under the ruling must have approval of the state "blue sky" department before they can be offered for sale to the Iowa public.

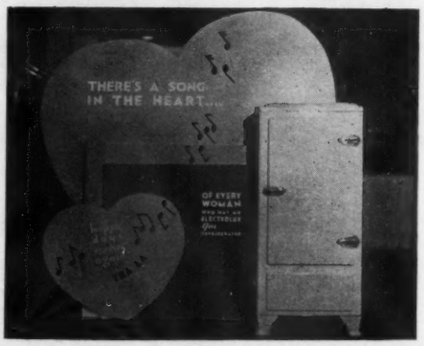
Dearborn Chemical Co. Issues Tannin Brick No. 2 Circular

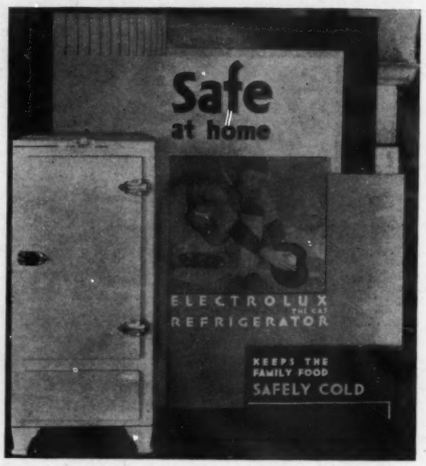
The Dearborn Chemical Co., Chicago, Ill., has issued a new circular describing the use of the Dearborn Tannin Brick No. 2 in cooling systems for diesel and gas engines, compressors, condensers, and open and closed systems of all types, for the prevention of scale and corrosion, algae growth, etc. Copies of the circular may be had from the company upon request.

P. V. A. A. Meet Due June 19

The Public Utilities Advertising Association will hold its 1934 convention on Tuesday, June 19, at the Hotel Pennsylvania, New York City, in conjunction with the annual convention of the Advertising Federation of America.







So. Counties Displays on Refrigeration

ILLUSTRATED above are three of a set of 10 Electrolux floor displays which are being used by Southern Counties Gas Co. during its current sales work on refrigeration. The displays, developed by W. D. Thurber, advertising manager of Southern Counties, are routed over the company's Southern California system under a schedule by which each of the major offices and several of the more important sub-offices will receive a change in floor display every two weeks. Opportunity for local Electrolux dealers to use these display materials is also afforded.

DIRECTORY

Byllesby Engineering and Management Corporation

Wholly-owned subsidiary of Standard Gas and Electric Company

231 South La Salle Street, Chicago
New York Pittsburgh San Francisco

• HYDRAUGER •

MODERN HORIZONTAL BORING MACHINE

For Underground Installation of Pipe and Conduits. Avoids damage to costly Pavements and saves time. Send for Bulletin.

HYDRAUGER CORPORATION, Ltd.

343 Sansome Street • San Francisco, California

SHEER 31-A MOTOR GAS VALVE
Now Entering Its Third Year
LEADS IN PERFORMANCE AND LOW PRICES

Also Hi-Lo Gas Valve, Step-Opening Gas Valve, Thermostats, Safety Pilots, Limit Controls, Space Heater Regulators, Humidifiers, Etc. . . . .
WRITE FOR CATALOG
H. M. SHEER CO., QUINCY, ILL.

DANIEL ORIFICE FITTING

MEETS THE SEVEREST OPERATING CONDITIONS
LET US TELL YOU OF OUR LATEST DEVELOPMENTS

DANIEL ORIFICE FITTING CO.
1900 SANTA FE AVE. LOS ANGELES

WESTERN GAS
Equipment Information Dept.,
810 So. Spring St., Los Angeles, Calif.

Please advise where I can secure data and prices on the following (equipment or appliance) for use in the gas or liquefied petroleum gas industry.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Company. . . . . .

By. . . . . .

Address. . . . . .

WEDGEWOOD

the MODERN *type*
HEAVY DUTY
GAS RANGES

* *5 years ahead in design economy convenience*

Send for this
NEW BULLETIN

Just off the press! Shows the new line of Wedgewood *Heavy-Duty* Gas Ranges complete, as well as Heavy-Duty Plates, Griddles, etc. Send the coupon for your copy!

There is no finer or more complete line of *Heavy-Duty* Gas Ranges in America than the *Modern* 1934 Wedgewoods. It includes a type and style for every cooking need. Four distinct finishes for each model. Temperature controlled roasting or baking. Oven sides have 3½" of rock-wool insulation for economy and coolness. A full score of *New* features! Send the coupon for complete information.

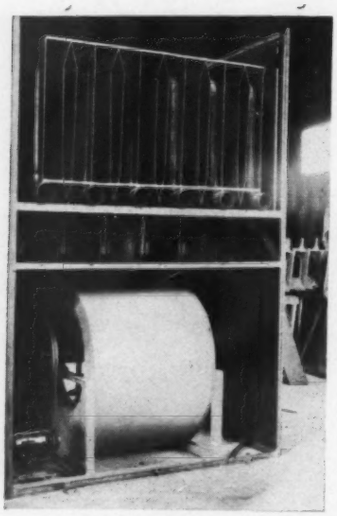
JAMES GRAHAM MANUFACTURING CO.
San Francisco, Newark, Los Angeles, California
Portland, Oregon

Send **COUPON** *for* **NEW BULLETIN**

JAMES GRAHAM MFG. CO.,
695 Bryant Street, San Francisco, Calif.

Without obligation, send your New Heavy-Duty Gas Range Bulletin to:

NAME.....
ADDRESS.....
CITY..... STATE.....



Rear of Electrogas 6 Unit Super-imposed

Electrogas Built-in Furnace Blower Units

THE Electrogas Furnace & Manufacturing Co., 2575 Bayshore Blvd., San Francisco, Calif., announces production of five series of built-in furnace blower units, available in 80 sizes. The domestic and commercial models are fitted with filters and slow-speed quiet blowers, while the industrial units are without filters, and may utilize if desired, smaller blowers running at higher speeds.

These units are manufactured in the side-by-side type, and in the super-imposed types with the blowers directly under the heating elements. They are also available in the suspended type, with blowers directly over the heating elements, for use in factories and commercial buildings.

The super-imposed units occupy no more cent streamlined stampings, fish-shaped in cross section, with no horizontal surfaces to cause "drag." The elements are interconnected, as are the individual burners; and between each element is a streamlined diverter to cause the forced air to closely wipe the elements at maximum velocity.

Blowers have die-formed steel blades running at low speeds, and of a design which maintains high pressures at low revolutions. Bearings are bronze-graphite, self-aligning type. When filters are utilized they are placed in the rear of the units and their enclosures from the cold air return connections.

The super-imposed units occupy no more floor space than the conventional gas furnace. The four-section unit, for example, is 33- x 35 inches and has a maximum delivery of 1800 CFM. It may be installed as a replacement of obsolete furnaces using other fuels, which usually have warm air ducts of adequate sizes, without the expense of installing larger ducts, registers and boxes. Its compact design allows its use in a home with limited basement area.

FULTON
Constant-Pressure
Pump Governor

CF

Definitely Regulates the Discharge Pressure of a Steam Driven Pump

THE governor here shown is designed to regulate the speed and consequently the discharge pressure of a steam-driven pump in the handling of oil, ammonia, water, other liquid or gas. The governor is installed in the steam line with its diaphragm connected to the discharge; and any tendency to drop or heighten pressure communicates itself to the valve, which instantly makes the needed adjustment. Discharge pressure thus remains at the normal pressure for which the governor is set.

The governor illustrated is spring weighted. A lever-and-weight type is preferable for certain uses and is also available. Correspondence is invited. Circulars on request. C-F Regulators and other Gas and Steam Specialties have been in successful use for fifty years.

The Chaplin-Fulton Manufacturing Co.

28-40 Penn Avenue **Pittsburgh, Pa.**

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $6.00 monthly on 12-time contract.

Situations Wanted

Situation wanted as engineer, foreman or local manager with natural gas company in city of from five to ten thousand population. Eight years experience installing and servicing industrial, commercial and domestic burners and appliances. Age 29. Will give references. Address Box E-245, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Experienced auditor and office manager, now with small gas utility, desires position offering opportunity for advancement. Initial salary not of first importance. Married. Address Box 247, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Imperial Valley Dry Ice Plant in Operation July 1

The Salton Sea Chemical Co.'s 10-ton dry ice plant, located near Niland, Calif., is expected to begin operation about July 1. Carl M. Einhart, Niland, is president of the company, which has been operating a small experimental plant producing and distributing dry ice and liquid carbonic gas throughout Imperial Valley.

The gas flows 1½ miles from the well to the plant. Production is estimated at 1,000,000 cubic feet per day of 99.9 per cent pure carbon dioxide gas.

D. C. Williams Re-elected President of N.G.A.

D. C. Williams, of the Continental Oil Co. was re-elected president of the Natural Gasoline Association of America for 1934-35, at the Association's annual meeting held in Tulsa during May. R. C. Wheeler of the General Petroleum Corp., W. E. Reardon of the Columbian Gasoline Corp., and John B. Atkins of the Parade Gasoline Co., were elected vice-presidents of the Association for the year.

Tax Hearings for Calif. Utilities

A series of hearings before the California State Board of Equalization began on May 31, to assist in the valuation of public utility properties, which will be placed on county tax rolls in 1935. Board members are conferring with representatives of principal classes of utilities, with separate hearings for railroad and express; gas, electric, telephone and telegraph; and companies owning intercounty pipe lines.

Mrs. Modern . . . AND

NATIONAL ADVERTISING

● Mrs. Modern reads national advertising with her *mind open* and her *guard down*, realizing that the most fruitful place to find new ideas and modern trends is in the advertising columns of the national magazines.

The result is that she has her impressions formed of a product before she goes into the store to look at it. In many cases this impression is so strongly favorable that little or no selling is required by the retailer.

That this is true in the case of Magic Chef national advertising is proved by many records in our files. We have reports from Magic Chef dealers all over the country of gas range sales made directly as the result of national magazine advertising. . .

For 15 years American Stove Company through national advertising has met the eye of Mrs. Modern with its message of advanced cooking methods and its appeal for better appreciation of the advantages of cooking with gas. That she has accepted the message with confidence and approval is no less a tribute to her intelligence than a test of the overwhelming power of uninterrupted national advertising for half a generation.

This national advertising not only has helped or directly made sales year after year during this period for the benefit of the retailer, but in its influence toward protecting the cooking load, it has immeasurably benefited the whole industry.

If you haven't seen the Magic Chef Portfolio for Spring, write for a copy.

(Look for this Trade Mark)
Magic Chef
AMERICAN STOVE COMPANY

AMERICAN STOVE COMPANY

WORLD'S LARGEST MANUFACTURER OF GAS RANGES

BOSTON • NEW YORK • ATLANTA • CLEVELAND • CHICAGO • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO • LOS ANGELES • SEATTLE

INSPECTED INSIDE TOO

Three years ago, Republic introduced Electric Weld Casing and Tubing. Sales progress at first was slow. Buyers were justifiably sceptical. They asked for facts, and we gave them. We made no attempt to hide the fact that this product was welded. On the contrary, we made sales capital by proving the weld 100% perfect. We showed that only by the Republic Electric Resistance Welding Process could pipe be made commercially that possessed the attributes of straightness, roundness, and uniformity of wall thickness, strength and size. We played up the fact that, because it was made from clean strip steel and formed cold, it was entirely free from scale. And today, *there is no other method of making oil country casing or tubing that produces a product so definitely free from inside defects,* and known to be so, because the inside surface of every length is inspected as it is formed, right up to the point of welding.

Split a length of pipe produced by *any* hot-rolled process, compare the inside with Republic Electric Weld, and draw your own conclusions.

Records show that nine and one-half million feet of Republic Electric Weld Casing and Tubing has been set by leading producers in all fields during the last three years.

May we send you additional facts?

REPUBLIC
ELECTRIC WELD
CASING AND TUBING

REPUBLIC STEEL CORPORATION
GENERAL OFFICES YOUNGSTOWN, OHIO